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ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-5) LAUNCH

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16. ABSTRACT

This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-5 launch time on November 11, 1982, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of preiaunch Jimsphere measured vertical wind profiles is given in this report. Also presented are the wind and thermodynamic parameters measured at the surface and aloft in the SRB descent/impact ocean area. Final meteorological tapes, which consist of wind and thermodynamic parameters versus altitude, for STS-5 vehicle ascent and SRB descent have been constructed. The STS-5 ascent meteorological data tape has been constructed by Marshall Space Flight Center in response to Shuttle task agreement No. 936-53-22-368 with Johnson Space Center.

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I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-5 vehicle. This Space Shuttle vehicle was launched from Pad 39A at Kennedy Space Center (KSC), Florida, on a bearing of 90 deg east of north at 1219 UT (0719 EST) on November 11, 1982.

This report presents a summary of the atmospheric environment at launch time (L+0) of the STS-5, together with the sequence of prelaunch Jimsphere measured winds aloft profiles from L-14 hr through liftoff. The general weather situation for the launch and flight area is described, and surface and upper level wind/thermodynamic observations near launch time are given. Surface and upper level wind/thermodynamic parameter measurements are also presented for the SRB descent/impact analyses.

Previous MSFC-related launch vehicle atmospheric environmental conditions have been published as Appendix A of individual MSFC Saturn Flight Evaluation Working Group reports [1]. Office memorandums have been issued for previous flights giving launch pad wind information. A report has also been published [2] which summarizes most launch atmospheric conditions observed for the past 155 MSFC/ABMA-related vehicle launches through SA-208 (Skylab 4). Reports summarizing ASTP, STS-1, STS-2, STS-3, and STS-4 launch conditions are presented in References 3, 4, 5, 6, and 7, respectively.

II. SOURCES OF DATA

Atmospheric observational data used in this report were taken from synoptic maps made by the National Weather Service, plus all available surface observations and measurements from around the launch area. Upper air observations were taken from balloon-released instruments sent aloft from Cape Canaveral Air Force Station (CCAFS) and from the ship Gen. H. S. Vandenberg in the Atlantic Ocean off the Florida coast. High-altitude winds and thermodynamic data were measured by the Super-Loki rocketsondes launched from the CCAFS. Table 1 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent meteorological data tape. Only the ship-launched Omegasonde-Rawinsonde and Super-Loki rocket data were used in the upper level atmospheric regions for the construction of the final SRB descent/impact meteorological data tape. Data cutoff altitudes are also given in Table 1.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

A ridge of high pressure, located off the northeast Atlantic coast, and extending through southern Alabama into the Gulf of Mexico, was an atmospheric influence over the Florida peninsula during the early morning launch. Along the peninsula, surface winds were northeasterly to easterly, ranging in magnitude

from 10 to 17 ft/sec. Very little cloud cover was present, along with low humidity and warm temperatures (low 70's) prevailing throughout the early morning countdown period. Figure 1 gives the surface weather map 19 min prior to launch. Figure 2 presents the wind flow aloft at the 500 mb level. Northwesterly winds dominated the flow aloft over the KSC Florida area.

Cloudiness was not very prevalent over the Florida peninsula or the KSC launch complex as shown in Figure 3. Figure 3 presents the GOES-5 visible picture taken 41 min after launch (1300 UT). Scattered cumulus clouds at 1200 ft were present during launch. Figure 4 shows an up-close visible shot of the Florida peninsula as recorded by GOES-5, taken at 1300 UT.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in Table 2. Included are pad 39A, Shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 3 presents Pad 39A wind data along with other standard hourly meteorological measurements and sky observations for the 6-hr period prior to launch of STS-5. Values for wind speed and direction are given for the 84 m (275 ft) FSS reference level and 18 m (60 ft) pad light pole level.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1235 UT), MSS rawinsonde (1348 UT), Super-Loki rocketsonde (1605 UT), and Super-Loki Robin (1445 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-5 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [8] parameters for November KSC conditions were used. A tabulation of the STS-5 final meteorological data for ascent is presented in Table 4 which lists the wind and thermodynamic parameters versus altitude. A brief summary of parameters is given in the following paragraphs.

A. Wind Speed

At launch time, wind speeds were 22.0 ft/sec (3.4 kn) at 60 ft and increased to a maximum of 146 ft/sec (86 kn) blowing from 336 deg. This maximum occurred at an altitude of 40,600 ft (12,375 m). The winds decreased above this level and then became stronger again at much higher levels, as shown in Figure 5. The overall maximum measured speed was 271 ft/sec (160 kn) at 185,000 ft (56,388 m) altitude.

B. Wind Direction

At launch time, the 60-ft wind direction was from the east (90 deg) and shifted through the north to a northwesterly component above 18,000 ft (5486 m). The winds then shifted into the winter-westerly regime above 86,000 ft (26,213 m). Figure 5 shows the complete wind direction versus altitude profile. As shown in Figure 5, wind directions became quite variable at altitudes with low wind speeds.

C. Prelaunch/Launch Wind Profiles

Prelaunch/launch wind profiles presented in Figures 6 through 9 were measured by the Jimsphere FPS-16 system. Data are shown for five measurement periods beginning at L-14 hr and extending through L+0.

The wind speed and direction profiles for the 14-hr period prior to and including L+0 are shown in Figures 6 and 7. The in-plane (right crosswind) and out-of-plane (left crosswind) profiles are given on Figures 8 and 9. The wind speeds were significantly greater than the November mean values in the 30,000 to 40,000 ft layer. Also, unusually strong northerly winds persisted during the 14 hr prior to L+0. Consequently, the peak measured wind speed at L+0 of about 150 ft/sec from a NNW direction at approximately 40,000 ft produced a left crosswind component of approximately 135 ft/sec. This equaled the 99th percentile statistical value obtained from November climatological records. A more detailed summary of the atmospheric patterns influencing STS 5 is presented in Appendix A of this document.

D. Thermodynamic Data

The thermodynamic data taken at STS-5 launch time, consisting of atmospheric temperature, dew-point temperature, pressure, and density have been compiled as the STS-5 ascent meteorological data and are presented in Table 4. The associated thermodynamic data taken in support of the SRB descent have also been assembled as the STS-5 SRB descent/impact meteorological data and are presented in Table 5. The vertical structure of temperature for the STS-5 ascent and for the SRB descent is shown graphically versus altitude in Figure 10.

The atmospheric thermodynamic parameters of temperature, pressure, and density, measured during STS-5 launch below 120,000 ft, were generally within 5 percent of their respective PRA-63 [9] annual values. All these parameters stayed within 20 percent of their respective PRA-63 values, at all levels.

E. SRB Upper Air and Surface Measurements

As has been mentioned in earlier paragraphs, an SRB descent meteorological data tape has also been constructed which consists of data taken from the Omegasonde-Rawinsonde system (1250 UT) aboard the USNS Vandenberg, which was stationed off the coast in the Atlantic Ocean. The CCAFS measured Super-Loki rocketsonde data and the GRA model data were used at altitude levels above the measured Omegasonde data. The tabular values for the SRB descent meteorological tape are presented in Table 5, with wind speed and direction profiles presented in Figure 11. Figure 10 gives the vertical temperature profile.

The surface-ship meteorological and oceanographic observations taken close to STS-5 SRB impact are presented in Table 6.

VI. ATMOSPHERIC SUMMARY CONDITIONS FOR STS LAUNCHES

Given in Table 7 are selected atmospheric L+0 launch conditions for all the Space Shuttle launches.

TABLE 1. SYSTEMS USED TO MEASURE UPPER AIR WIND DATA FOR STS-5 ASCENT*

Type of Data	Date: November 11, 1982		Portion of Data Used			
	Release Time		Start		End	
	Time (UT) (hr:min)	Time After T+0 (min)	Altitude m (ft)	Time After T+0 (min)	Altitude m (ft)	Time After T+0 (min)
FPS-16 Jimsphere	12:35	16	6 (21)	16	17,069 (56,000)	74
MSS Rawinsonde	13:48	89	17,374 (57,000)	146	28, 042 (92,000)	181
Super-Loki Rocketsonde (Datasonde)	16:05	226	68,885 (226,000)	226	28,346 (93,000)	248
Super-Loki Rocketsonde (Robin)	14:45	146	84,430 (277,000)	146	69,190 (227,000)	147
Omegasonde-Rawinsonde*	12:50	31	18 (60)	31	28,042 (92,000)	123

*The Omegasonde-Rawinsonde was released from the USNS Gen. H. S. Vandenberg to measure the upper atmosphere for SRB descent/impact analyses.

TABLE 2. SURFACE OBSERVATIONS AT STS-5 LAUNCH TIME

Location[a]	Time After L+0 (min)	Pressure (MSL) N/cm^2 (psia)	Temperature °K (°F)	Dew Point °K (°F)	Relative Humidity (%)	Visibility km (miles)	Sky Cover			Wind	
							Cloud** Amount (Tenths)	Cloud Type	Height of Base Meters (ft)	Speed ft/sec (kt)	Direction (deg)
NASA Space Shuttle Runway[e] Winds Measured at 10.4 m (34 ft)	0	10.233 (14.842)	295.4 (72.0)	291.0 (64.0)	75	16 (10)	1	Strato-Cumulus	1219 (4,000)	8.4 (5.0)	080
[illegible][c] Surface Measurements	0	10.227 (14.833)	294.9 (71.2)	290.4 (63.0)	76	16 (10)	1	Strato-Cumulus	975 (3200)	15.2 (9.0)	090
Pad 39A Lightpole[d] SE 18.3 m (60.0 ft)	0	10.227* (14.833)	295.2 (71.6)	286.7 (56.4)	59	–	–	–	–	22.0[b] (13.0)	90[b]
Pad 39A FSS (Top-SE) 83.8 m (275 ft)	0	–	–	–	–	–	–	–	–	35.0[b] (20.7)	90[b]

* Pad 39A Camera Site 3 barometric pressure instrument appeared to be reading too low. Therefore, the KSC Shuttle runway station pressure value interpolated to 10.227 N/cm^2 at 21 ft above MSL would be more appropriate as the L+0 pad atmospheric pressure measurement.

** One-tenth total sky cover.

a. Altitudes of measurements are above natural grade, except where noted.

b. Approximately 1 min average prior to L+0.

c. Balloon release site.

d. Pad 39A thermodynamic measurements are taken at camera site No. 3, approximately 6.4 m (21 ft) above MSL.

e. Official STS-5 sky observational site.

TABLE 3. STS-5 PRE-LAUNCH THROUGH LAUNCH KSC PAD 39A METEOROLOGICAL MEASUREMENTS*

Hourly Atmospheric Measurements								Sky Condition			
11 November 1982 Time UT	Temp. (°F)	Dew Point (°F)	RH (%)	275' Level (SE)**		60' Level (SE)**		Clouds	Total Sky Cover	Vis. (mi.)	Other Remarks
				WS Kt	WD°	WS Kt	WD°				
0700	71	61	70	23	080	11	080	2/10 SC at 3,200 ft	2/10	10	
0800	70	59	68	23	090	9	090	1/10 SC at 3,200 ft	1/10	10	
0900	71	59	67	22	090	12	090	3/10 SC at 3,200 ft	3/10	10	
1000	71	57	62	23	090	12	090	1/10 SC at 3,500 ft	1/10	10	
1100	71	55	58	22	090	13	090	1/10 SC at 4,000 ft	1/10	10	
1200	71	58	64	22	080	13	080	1/10 SC at 4,000 ft	1/10	10	
L+0*** 1219	72	61	68	21	090	13	090	1/10 SC at 4,000 ft	1/10	10	

* Hourly observations obtained verbally from CCAFS.

** 10 min mean about the hour from pad 39A instrumentation.

*** L+0 PAD Wind and thermodynamic parameters obtained from HOSC strip charts. SE Anemometers used at 60 and 275 ft levels for L+0 wind conditions (approximately 1 min average prior to L+0). Pad 39A L+0 atmospheric pressure, at 21 ft (MSL), was 10.227 N/cm^2. Sea level pressure was 10.233 N/cm^2.

TABLE 4. STS-5 FINAL T+0 ASCENT METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000021	016	090	22.1	.1023+04	.1199+04	16.0
000100	019	089	22.0	.1020+04	.1196+04	15.8
000200	022	088	21.8	.1016+04	.1192+04	15.6
000300	030	087	21.7	.1013+04	.1189+04	15.4
000400	028	087	21.5	.1009+04	.1185+04	15.2
000500	031	081	21.4	.1006+04	.1182+04	15.0
000600	034	087	21.2	.1002+04	.1179+04	14.8
000700	037	088	21.1	.9987+03	.1175+04	14.6
000800	034	088	20.9	.9952+03	.1172+04	14.4
000900	033	085	20.8	.9918+03	.1168+04	14.2
001000	035	081	20.6	.9883+03	.1165+04	14.0
001100	037	085	20.4	.9848+03	.1162+04	13.9
001200	035	089	20.1	.9814+03	.1159+04	13.9
001300	038	090	19.9	.9779+03	.1155+04	13.8
001400	035	086	19.6	.9745+03	.1152+04	13.7
001500	039	088	19.4	.9711+03	.1149+04	13.7
001600	038	092	19.2	.9676+03	.1146+04	13.6
001700	034	090	18.9	.9642+03	.1143+04	13.5
001800	035	085	18.7	.9609+03	.1140+04	13.4
001900	039	088	18.4	.9575+03	.1137+04	13.4
002000	037	089	18.2	.9541+03	.1134+04	13.3
002100	034	086	17.9	.9507+03	.1131+04	13.1
002200	036	084	17.7	.9473+03	.1128+04	12.9
002300	039	085	17.4	.9440+03	.1125+04	12.7
002400	037	085	17.1	.9406+03	.1122+04	12.5
002500	035	081	16.9	.9373+03	.1119+04	12.4
002600	038	081	16.6	.9339+03	.1116+04	12.2
002700	038	086	16.3	.9306+03	.1114+04	12.0
002800	035	085	16.0	.9273+03	.1111+04	11.8
002900	036	085	15.8	.9240+03	.1108+04	11.6
003000	038	087	15.5	.9207+03	.1105+04	11.4
003100	036	088	15.2	.9174+03	.1102+04	11.1
003200	036	084	15.0	.9141+03	.1099+04	10.9
003300	039	084	14.7	.9109+03	.1096+04	10.6
003400	038	086	14.5	.9076+03	.1094+04	10.3
003500	038	090	14.2	.9043+03	.1091+04	10.1
003600	039	081	13.9	.9011+03	.1088+04	9.8
003700	037	085	13.7	.8979+03	.1085+04	9.5
003800	036	079	13.4	.8946+03	.1082+04	9.2
003900	036	081	13.2	.8914+03	.1079+04	9.0
004000	034	082	12.9	.8882+03	.1077+04	8.7
004100	035	079	12.7	.8850+03	.1073+04	8.5
004200	035	084	12.5	.8818+03	.1070+04	8.3
004300	032	086	12.3	.8786+03	.1067+04	8.1
004400	033	079	12.1	.8754+03	.1064+04	7.9
004500	035	073	11.9	.8723+03	.1061+04	7.7
004600	035	073	11.7	.8691+03	.1058+04	7.5
004700	029	068	11.5	.8659+03	.1055+04	7.3
004800	030	063	11.3	.8628+03	.1052+04	7.1
004900	033	065	11.1	.8597+03	.1049+04	6.9

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
005000	033	071	10.9	.8566+03	.1046+04	6.7
005100	033	063	10.8	.8535+03	.1043+04	6.3
005200	037	060	10.7	.8503+03	.1039+04	5.9
005300	039	062	10.7	.8472+03	.1036+04	5.6
005400	037	061	10.6	.8442+03	.1032+04	5.2
005500	037	053	10.5	.8411+03	.1029+04	4.8
005600	036	050	10.4	.8380+03	.1026+04	4.4
005700	037	055	10.3	.8350+03	.1022+04	4.0
005800	035	054	10.3	.8319+03	.1019+04	3.7
005900	036	046	10.2	.8289+03	.1016+04	3.3
006000	034	047	10.1	.8259+03	.1012+04	2.9
006100	033	047	10.0	.8229+03	.1009+04	2.4
006200	035	046	9.9	.8199+03	.1006+04	1.9
006300	034	049	9.9	.8169+03	.1002+04	1.4
006400	031	044	9.8	.8139+03	.9991+03	.9
006500	034	039	9.7	.8109+03	.9958+03	.4
006600	035	041	9.6	.8080+03	.9926+03	-.2
006700	031	042	9.5	.8050+03	.9893+03	-.7
006800	028	038	9.5	.8021+03	.9861+03	-1.2
006900	028	034	9.4	.7991+03	.9828+03	-1.7
007000	027	042	9.3	.7962+03	.9796+03	-2.2
007100	022	050	9.2	.7933+03	.9764+03	-3.4
007200	017	051	9.2	.7904+03	.9732+03	-4.6
007300	017	045	9.1	.7875+03	.9699+03	-5.8
007400	017	053	9.1	.7846+03	.9667+03	-7.0
007500	016	081	9.0	.7817+03	.9635+03	-8.2
007600	013	101	9.0	.7789+03	.9602+03	-9.4
007700	013	094	9.0	.7760+03	.9570+03	-10.6
007800	019	090	8.9	.7732+03	.9538+03	-11.8
007900	019	114	8.9	.7703+03	.9506+03	-13.0
008000	019	112	8.8	.7675+03	.9473+03	-14.2
008100	018	101	9.0	.7647+03	.9432+03	-14.0
008200	017	105	9.2	.7619+03	.9391+03	-13.9
008300	013	109	9.4	.7591+03	.9351+03	-13.7
008400	008	089	9.6	.7563+03	.9310+03	-13.6
008500	008	064	9.7	.7536+03	.9269+03	-13.4
008600	007	044	9.9	.7508+03	.9229+03	-13.3
008700	008	011	10.1	.7481+03	.9189+03	-13.1
008800	009	011	10.3	.7453+03	.9149+03	-13.0
008900	006	019	10.5	.7426+03	.9109+03	-12.9
009000	006	007	10.7	.7399+03	.9070+03	-12.7
009100	009	009	10.5	.7372+03	.9042+03	-12.8
009200	008	028	10.4	.7345+03	.9015+03	-12.9
009300	006	027	10.2	.7318+03	.8987+03	-12.9
009400	009	008	10.0	.7291+03	.8960+03	-13.0
009500	010	019	9.9	.7265+03	.8932+03	-13.1
009600	008	027	9.7	.7238+03	.8905+03	-13.2
009700	006	357	9.5	.7211+03	.8878+03	-13.3
009800	010	001	9.3	.7185+03	.8850+03	-13.3
009900	009	007	9.2	.7159+03	.8823+03	-13.4

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
010000	008	355	9.0	.7133+03	.8796+03	-13.5
010100	013	358	8.8	.7106+03	.8772+03	-13.8
010200	012	010	8.5	.7080+03	.8747+03	-14.0
010300	011	005	8.3	.7054+03	.8722+03	-14.3
010400	014	003	8.0	.7028+03	.8698+03	-14.5
010500	017	009	7.8	.7002+03	.8673+03	-14.8
010600	015	016	7.6	.6976+03	.8649+03	-15.1
010700	014	012	7.3	.6951+03	.8625+03	-15.3
010800	017	014	7.1	.6925+03	.8600+03	-15.6
010900	018	023	6.8	.6900+03	.8576+03	-15.8
011000	016	026	6.6	.6874+03	.8552+03	-16.1
011100	017	017	6.4	.6849+03	.8526+03	-16.3
011200	019	021	6.2	.6823+03	.8500+03	-16.4
011300	018	028	6.1	.6798+03	.8474+03	-16.6
011400	016	026	5.9	.6773+03	.8448+03	-16.8
011500	019	023	5.7	.6747+03	.8422+03	-16.9
011600	021	035	5.5	.6722+03	.8396+03	-17.1
011700	018	041	5.3	.6697+03	.8371+03	-17.3
011800	020	037	5.2	.6673+03	.8345+03	-17.5
011900	024	041	5.0	.6648+03	.8319+03	-17.6
012000	025	042	4.8	.6623+03	.8294+03	-17.8
012100	021	039	4.6	.6598+03	.8268+03	-17.4
012200	022	031	4.5	.6574+03	.8241+03	-17.0
012300	022	038	4.3	.6549+03	.8215+03	-16.6
012400	018	036	4.2	.6525+03	.8189+03	-16.2
012500	018	025	4.0	.6500+03	.8162+03	-15.8
012600	019	029	3.8	.6476+03	.8136+03	-15.4
012700	018	040	3.7	.6452+03	.8110+03	-15.0
012800	017	040	3.5	.6428+03	.8084+03	-14.6
012900	021	045	3.4	.6404+03	.8058+03	-14.2
013000	019	054	3.2	.6380+03	.8033+03	-13.8
013100	020	045	3.1	.6356+03	.8007+03	-13.8
013200	023	049	2.9	.6332+03	.7981+03	-13.9
013300	021	056	2.7	.6308+03	.7955+03	-13.9
013400	022	057	2.6	.6285+03	.7930+03	-13.9
013500	025	064	2.4	.6261+03	.7904+03	-13.9
013600	024	065	2.3	.6238+03	.7879+03	-14.0
013700	025	055	2.2	.6214+03	.7854+03	-14.0
013800	027	054	2.0	.6191+03	.7828+03	-14.0
013900	026	053	1.8	.6168+03	.7803+03	-14.1
014000	028	045	1.7	.6144+03	.7778+03	-14.1
014100	029	046	1.5	.6121+03	.7756+03	-14.3
014200	027	045	1.2	.6098+03	.7733+03	-14.4
014300	029	038	1.0	.6075+03	.7711+03	-14.6
014400	029	038	.7	.6052+03	.7688+03	-14.8
014500	028	036	.5	.6029+03	.7666+03	-14.9
014600	030	031	.3	.6006+03	.7644+03	-15.1
014700	029	034	.0	.5984+03	.7622+03	-15.3
014800	029	027	-.2	.5961+03	.7600+03	-15.5
014900	032	028	-.5	.5939+03	.7578+03	-15.6

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
015000	032	030	-.7	.5916+03	.7556+03	-15.8
015100	033	022	-.8	.5894+03	.7529+03	-16.2
015200	034	023	-.8	.5871+03	.7502+03	-16.7
015300	033	021	-.9	.5849+03	.7476+03	-17.1
015400	036	016	-.9	.5827+03	.7449+03	-17.5
015500	035	019	-1.0	.5804+03	.7423+03	-17.9
015600	035	019	-1.1	.5782+03	.7396+03	-18.4
015700	039	018	-1.1	.5760+03	.7370+03	-18.8
015800	040	021	-1.2	.5738+03	.7344+03	-19.2
015900	038	017	-1.2	.5717+03	.7318+03	-19.7
016000	040	018	-1.3	.5695+03	.7292+03	-20.1
016100	037	017	-1.4	.5673+03	.7267+03	-20.4
016200	039	009	-1.5	.5652+03	.7241+03	-20.6
016300	040	010	-1.6	.5630+03	.7216+03	-20.9
016400	039	007	-1.7	.5609+03	.7191+03	-21.2
016500	043	007	-1.7	.5587+03	.7166+03	-21.4
016600	045	009	-1.8	.5566+03	.7141+03	-21.7
016700	045	007	-1.9	.5545+03	.7117+03	-22.0
016800	048	007	-2.0	.5524+03	.7092+03	-22.3
016900	048	005	-2.1	.5502+03	.7067+03	-22.5
017000	050	360	-2.2	.5481+03	.7043+03	-22.9
017100	047	358	-2.2	.5461+03	.7017+03	-23.0
017200	048	356	-2.3	.5440+03	.6992+03	-23.2
017300	050	356	-2.3	.5419+03	.6967+03	-23.4
017400	048	353	-2.4	.5398+03	.6941+03	-23.6
017500	048	351	-2.4	.5378+03	.6916+03	-23.8
017600	046	351	-2.5	.5357+03	.6891+03	-24.0
017700	045	350	-2.5	.5337+03	.6866+03	-24.2
017800	044	347	-2.6	.5316+03	.6841+03	-24.4
017900	043	346	-2.6	.5296+03	.6816+03	-24.6
018000	046	346	-2.7	.5276+03	.6792+03	-24.8
018100	043	346	-2.9	.5255+03	.6770+03	-25.0
018200	044	339	-3.1	.5235+03	.6749+03	-25.2
018300	043	338	-3.3	.5215+03	.6728+03	-25.3
018400	038	336	-3.5	.5195+03	.6707+03	-25.5
018500	040	334	-3.6	.5175+03	.6686+03	-25.7
018600	039	337	-3.8	.5155+03	.6665+03	-25.9
018700	037	334	-4.0	.5135+03	.6644+03	-26.1
018800	037	333	-4.2	.5116+03	.6623+03	-26.2
018900	034	338	-4.4	.5096+03	.6603+03	-26.4
019000	033	335	-4.6	.5077+03	.6582+03	-26.6
019100	033	337	-4.9	.5057+03	.6563+03	-26.7
019200	031	341	-5.2	.5037+03	.6545+03	-26.8
019300	030	338	-5.4	.5018+03	.6526+03	-27.0
019400	030	342	-5.7	.4998+03	.6508+03	-27.1
019500	028	343	-6.0	.4979+03	.6489+03	-27.2
019600	029	341	-6.3	.4960+03	.6471+03	-27.3
019700	030	347	-6.6	.4940+03	.6453+03	-27.4
019800	029	346	-6.8	.4921+03	.6435+03	-27.6
019900	032	343	-7.1	.4902+03	.6416+03	-27.7

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
020000	030	348	-7.4	.4883+03	.6398+03	-27.8
020100	027	342	-7.7	.4864+03	.6380+03	-27.9
020200	031	345	-8.0	.4845+03	.6362+03	-28.1
020300	028	349	-8.2	.4826+03	.6344+03	-28.2
020400	029	346	-8.5	.4807+03	.6325+03	-28.4
020500	030	349	-8.8	.4788+03	.6307+03	-28.5
020600	028	348	-9.1	.4770+03	.6289+03	-28.7
020700	028	345	-9.4	.4751+03	.6271+03	-28.8
020800	028	350	-9.6	.4732+03	.6254+03	-29.0
020900	027	348	-9.9	.4714+03	.6236+03	-29.1
021000	029	344	-10.2	.4695+03	.6218+03	-29.3
021100	028	348	-10.5	.4677+03	.6200+03	-29.4
021200	026	340	-10.8	.4658+03	.6182+03	-29.5
021300	029	340	-11.0	.4640+03	.6164+03	-29.5
021400	027	343	-11.3	.4622+03	.6146+03	-29.6
021500	026	333	-11.6	.4603+03	.6129+03	-29.7
021600	029	338	-11.9	.4585+03	.6111+03	-29.8
021700	027	338	-12.2	.4567+03	.6093+03	-29.9
021800	028	333	-12.4	.4549+03	.6076+03	-29.9
021900	029	335	-12.7	.4531+03	.6058+03	-30.0
022000	029	334	-13.0	.4513+03	.6041+03	-30.1
022100	029	330	-13.3	.4495+03	.6023+03	-30.1
022200	030	333	-13.5	.4477+03	.6005+03	-30.2
022300	028	333	-13.8	.4459+03	.5987+03	-30.2
022400	032	326	-14.0	.4441+03	.5969+03	-30.2
022500	032	329	-14.3	.4424+03	.5951+03	-30.2
022600	031	325	-14.6	.4406+03	.5933+03	-30.3
022700	033	321	-14.8	.4388+03	.5915+03	-30.3
022800	033	324	-15.1	.4371+03	.5898+03	-30.3
022900	033	320	-15.3	.4353+03	.5880+03	-30.4
023000	036	319	-15.6	.4336+03	.5862+03	-30.4
023100	038	320	-15.8	.4318+03	.5844+03	-30.3
023200	040	318	-16.1	.4301+03	.5826+03	-30.2
023300	041	314	-16.3	.4284+03	.5809+03	-30.1
023400	045	314	-16.6	.4266+03	.5791+03	-30.0
023500	045	315	-16.8	.4249+03	.5773+03	-30.0
023600	044	312	-17.1	.4232+03	.5755+03	-29.9
023700	048	312	-17.3	.4215+03	.5738+03	-29.8
023800	047	316	-17.6	.4198+03	.5720+03	-29.7
023900	047	314	-17.8	.4181+03	.5702+03	-29.6
024000	050	313	-18.1	.4164+03	.5685+03	-29.5
024100	050	315	-18.3	.4147+03	.5666+03	-29.7
024200	051	314	-18.5	.4130+03	.5647+03	-30.0
024300	054	314	-18.6	.4113+03	.5628+03	-30.2
024400	054	317	-18.8	.4097+03	.5609+03	-30.5
024500	051	314	-19.0	.4080+03	.5590+03	-30.7
024600	054	315	-19.2	.4063+03	.5571+03	-31.0
024700	053	316	-19.4	.4047+03	.5553+03	-31.3
024800	053	317	-19.5	.4030+03	.5534+03	-31.5
024900	055	316	-19.7	.4014+03	.5515+03	-31.7

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
025000	05	318	-19.9	.3998+03	.5497+03	-32.0
025100	050	318	-20.0	.3981+03	.5477+03	-32.4
025200	048	319	-20.2	.3965+03	.5458+03	-32.9
025300	048	321	-20.3	.3949+03	.5438+03	-33.3
025400	046	322	-20.4	.3933+03	.5419+03	-33.7
025500	045	325	-20.5	.3916+03	.5400+03	-34.1
025600	045	328	-20.7	.3900+03	.5380+03	-34.6
025700	044	326	-20.8	.3884+03	.5361+03	-35.0
025800	044	329	-20.9	.3869+03	.5342+03	-35.4
025900	042	333	-21.1	.3853+03	.5323+03	-35.9
026000	043	333	-21.2	.3837+03	.5304+03	-36.3
026100	043	337	-21.4	.3821+03	.5287+03	-36.6
026200	041	337	-21.7	.3805+03	.5270+03	-36.8
026300	044	340	-21.9	.3790+03	.5254+03	-37.1
026400	042	341	-22.2	.3774+03	.5237+03	-37.4
026500	041	338	-22.4	.3759+03	.5221+03	-37.6
026600	044	340	-22.6	.3743+03	.5204+03	-37.9
026700	041	341	-22.9	.3728+03	.5188+03	-38.2
026800	041	342	-23.1	.3712+03	.5171+03	-38.5
026900	046	341	-23.4	.3697+03	.5155+03	-38.7
027000	041	345	-23.6	.3682+03	.5139+03	-39.0
027100	043	343	-23.8	.3666+03	.5122+03	-39.2
027200	045	342	-24.1	.3651+03	.5105+03	-39.4
027300	043	345	-24.3	.3636+03	.5089+03	-39.6
027400	043	345	-24.5	.3621+03	.5072+03	-39.8
027500	046	344	-24.7	.3606+03	.5056+03	-40.0
027600	043	348	-25.0	.3591+03	.5040+03	-40.3
027700	043	348	-25.2	.3576+03	.5023+03	-40.5
027800	046	346	-25.4	.3561+03	.5007+03	-40.7
027900	041	347	-25.7	.3546+03	.4991+03	-40.9
028000	047	346	-25.9	.3531+03	.4975+03	-41.1
028100	047	349	-26.2	.3517+03	.4959+03	-41.3
028200	046	348	-26.4	.3502+03	.4943+03	-41.4
028300	049	347	-26.7	.3487+03	.4928+03	-41.6
028400	048	350	-26.9	.3472+03	.4912+03	-41.8
028500	048	349	-27.2	.3458+03	.4897+03	-41.9
028600	051	348	-27.5	.3443+03	.4881+03	-42.1
028700	049	352	-27.7	.3429+03	.4866+03	-42.3
028800	053	350	-28.0	.3414+03	.4851+03	-42.5
028900	055	353	-28.2	.3400+03	.4835+03	-42.6
029000	056	352	-28.5	.3386+03	.4820+03	-42.8
029100	058	352	-28.7	.3371+03	.4804+03	-42.9
029200	057	352	-29.0	.3357+03	.4788+03	-42.9
029300	059	349	-29.2	.3343+03	.4772+03	-43.0
029400	059	350	-29.4	.3328+03	.4757+03	-43.1
029500	059	348	-29.6	.3314+03	.4741+03	-43.1
029600	058	350	-29.9	.3300+03	.4725+03	-43.2
029700	059	347	-30.1	.3286+03	.4710+03	-43.3
029800	058	346	-30.3	.3272+03	.4694+03	-43.4
029900	058	344	-30.6	.3258+03	.4679+03	-43.4

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
030000	058	344	-30.8	.3244+03	.4663+03	-43.5
030100	057	342	-31.1	.3231+03	.4648+03	-43.4
030200	059	340	-31.3	.3217+03	.4633+03	-43.4
030300	061	336	-31.6	.3203+03	.4618+03	-43.3
030400	065	336	-31.8	.3189+03	.4603+03	-43.2
030500	064	335	-32.1	.3176+03	.4589+03	-43.2
030600	067	336	-32.4	.3162+03	.4574+03	-43.1
030700	069	338	-32.6	.3148+03	.4559+03	-43.0
030800	069	334	-32.9	.3135+03	.4544+03	-42.9
030900	069	337	-33.1	.3121+03	.4530+03	-42.9
031000	069	334	-33.4	.3108+03	.4515+03	-42.8
031100	072	334	-33.6	.3095+03	.4500+03	-42.9
031200	071	334	-33.9	.3081+03	.4486+03	-43.0
031300	074	333	-34.1	.3068+03	.4471+03	-43.2
031400	073	335	-34.4	.3054+03	.4456+03	-43.3
031500	072	334	-34.6	.3041+03	.4442+03	-43.4
031600	076	334	-34.9	.3028+03	.4427+03	-43.5
031700	077	333	-35.1	.3015+03	.4412+03	-43.6
031800	080	333	-35.4	.3002+03	.4398+03	-43.8
031900	084	333	-35.6	.2989+03	.4383+03	-43.9
032000	082	334	-35.9	.2976+03	.4369+03	-44.0
032100	086	333	-36.1	.2963+03	.4354+03	-44.1
032200	089	333	-36.4	.2950+03	.4340+03	-44.2
032300	089	332	-36.6	.2937+03	.4326+03	-44.3
032400	091	333	-36.9	.2924+03	.4311+03	-44.4
032500	091	333	-37.1	.2911+03	.4297+03	-44.4
032600	097	332	-37.4	.2899+03	.4283+03	-44.5
032700	096	334	-37.6	.2886+03	.4268+03	-44.6
032800	097	333	-37.9	.2873+03	.4254+03	-44.7
032900	100	334	-38.1	.2861+03	.4240+03	-44.8
033000	099	335	-38.4	.2848+03	.4226+03	-44.9
033100	100	333	-38.7	.2836+03	.4212+03	-45.1
033200	102	335	-38.9	.2823+03	.4198+03	-45.4
033300	102	335	-39.2	.2810+03	.4184+03	-45.6
033400	104	335	-39.4	.2798+03	.4170+03	-45.9
033500	099	338	-39.7	.2786+03	.4156+03	-46.1
033600	102	336	-40.0	.2773+03	.4143+03	-46.3
033700	101	338	-40.2	.2761+03	.4129+03	-46.6
033800	102	339	-40.5	.2749+03	.4115+03	-46.8
033900	103	338	-40.7	.2737+03	.4102+03	-47.1
034000	105	339	-41.0	.2725+03	.4088+03	-47.3
034100	105	339	-41.3	.2712+03	.4074+03	-47.5
034200	109	338	-41.5	.2700+03	.4061+03	-47.8
034300	110	339	-41.8	.2688+03	.4047+03	-48.0
034400	109	340	-42.0	.2676+03	.4033+03	-48.3
034500	112	339	-42.3	.2664+03	.4020+03	-48.5
034600	112	339	-42.6	.2652+03	.4006+03	-48.7
034700	113	339	-42.8	.2640+03	.3993+03	-49.0
034800	116	339	-43.1	.2628+03	.3980+03	-49.2
034900	115	338	-43.3	.2617+03	.3966+03	-49.5

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
035000	116	338	-43.6	.2605+03	.3953+03	-49.7
035100	115	339	-43.8	.2593+03	.3938+03	-49.8
035200	115	337	-44.0	.2582+03	.3924+03	-50.0
035300	118	337	-44.2	.2570+03	.3909+03	-50.1
035400	118	339	-44.4	.2558+03	.3895+03	-50.2
035500	118	338	-44.5	.2547+03	.3881+03	-50.3
035600	118	339	-44.7	.2535+03	.3866+03	-50.5
035700	120	338	-44.9	.2524+03	.3852+03	-50.6
035800	121	336	-45.1	.2512+03	.3838+03	-50.7
035900	120	337	-45.3	.2501+03	.3824+03	-50.9
036000	121	335	-45.5	.2490+03	.3810+03	-51.0
036100	121	337	-45.7	.2478+03	.3796+03	-51.2
036200	121	335	-46.0	.2467+03	.3783+03	-51.4
036300	123	338	-46.2	.2456+03	.3769+03	-51.6
036400	126	334	-46.4	.2445+03	.3756+03	-51.8
036500	126	333	-46.6	.2433+03	.3742+03	-52.0
036600	125	334	-46.9	.2422+03	.3729+03	-52.3
036700	125	333	-47.1	.2411+03	.3716+03	-52.5
036800	126	334	-47.3	.2400+03	.3703+03	-52.7
036900	125	335	-47.6	.2389+03	.3689+03	-52.9
037000	125	334	-47.8	.2378+03	.3676+03	-53.1
037100	129	335	-48.0	.2367+03	.3663+03	-53.3
037200	128	336	-48.3	.2356+03	.3650+03	-53.6
037300	132	336	-48.5	.2346+03	.3637+03	-53.8
037400	133	336	-48.8	.2335+03	.3625+03	-54.0
037500	130	336	-49.0	.2324+03	.3612+03	-54.2
037600	133	336	-49.2	.2313+03	.3599+03	-54.5
037700	131	337	-49.5	.2303+03	.3586+03	-54.7
037800	128	339	-49.7	.2292+03	.3574+03	-54.9
037900	132	335	-50.0	.2282+03	.3561+03	-55.2
038000	132	337	-50.2	.2271+03	.3548+03	-55.4
038100	133	338	-50.4	.2260+03	.3535+03	-55.6
038200	131	337	-50.6	.2250+03	.3522+03	-55.8
038300	132	338	-50.8	.2239+03	.3509+03	-56.1
038400	132	337	-51.0	.2229+03	.3496+03	-56.3
038500	132	335	-51.2	.2219+03	.3483+03	-56.5
038600	132	335	-51.5	.2208+03	.3470+03	-56.7
038700	132	334	-51.7	.2198+03	.3457+03	-56.9
038800	131	336	-51.9	.2188+03	.3444+03	-57.2
038900	129	338	-52.1	.2178+03	.3431+03	-57.4
039000	134	332	-52.3	.2167+03	.3419+03	-57.6
039100	135	334	-52.5	.2157+03	.3406+03	-57.8
039200	133	336	-52.8	.2147+03	.3394+03	-58.1
039300	135	334	-53.0	.2137+03	.3382+03	-58.3
039400	136	335	-53.3	.2127+03	.3370+03	-58.6
039500	137	335	-53.5	.2117+03	.3358+03	-58.8
039600	136	335	-53.8	.2107+03	.3346+03	-59.0
039700	135	337	-54.0	.2097+03	.3334+03	-59.3
039800	136	335	-54.3	.2087+03	.3322+03	-59.5
039900	141	335	-54.5	.2077+03	.3310+03	-59.8

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
040000	142	336	-54.8	.2068+03	.3299+03	-60.0
040100	142	335	-55.0	.2058+03	.3287+03	-60.2
040200	143	336	-55.3	.2048+03	.3275+03	-60.5
040300	143	337	-55.5	.2038+03	.3263+03	-60.7
040400	143	337	-55.8	.2029+03	.3251+03	-60.9
040500	144	337	-56.0	.2019+03	.3239+03	-61.1
040600	146	336	-56.2	.2009+03	.3227+03	-61.4
040700	144	336	-56.5	.2000+03	.3215+03	-61.6
040800	144	336	-56.7	.1990+03	.3203+03	-61.8
040900	141	338	-57.0	.1981+03	.3192+03	-62.1
041000	144	337	-57.2	.1971+03	.3180+03	-62.3
041100	141	336	-57.4	.1962+03	.3168+03	-9999.
041200	141	337	-57.7	.1952+03	.3156+03	-9999.
041300	141	338	-57.9	.1943+03	.3145+03	-9999.
041400	139	338	-58.1	.1934+03	.3133+03	-9999.
041500	141	336	-58.3	.1924+03	.3121+03	-9999.
041600	139	337	-58.6	.1915+03	.3109+03	-9999.
041700	141	336	-58.8	.1906+03	.3098+03	-9999.
041800	138	339	-59.0	.1897+03	.3086+03	-9999.
041900	136	339	-59.3	.1888+03	.3075+03	-9999.
042000	140	340	-59.5	.1879+03	.3063+03	-9999.
042100	137	339	-59.7	.1869+03	.3052+03	-9999.
042200	140	340	-60.0	.1860+03	.3040+03	-9999.
042300	136	341	-60.2	.1851+03	.3029+03	-9999.
042400	138	339	-60.4	.1842+03	.3017+03	-9999.
042500	139	341	-60.6	.1833+03	.3006+03	-9999.
042600	139	340	-60.9	.1824+03	.2994+03	-9999.
042700	139	340	-61.1	.1816+03	.2983+03	-9999.
042800	141	339	-61.3	.1807+03	.2972+03	-9999.
042900	140	340	-61.6	.1798+03	.2960+03	-9999.
043000	139	342	-61.8	.1789+03	.2949+03	-9999.
043100	134	342	-62.0	.1781+03	.2938+03	-9999.
043200	137	339	-62.2	.1772+03	.2927+03	-9999.
043300	135	341	-62.5	.1763+03	.2915+03	-9999.
043400	133	341	-62.7	.1754+03	.2904+03	-9999.
043500	133	340	-62.9	.1746+03	.2893+03	-9999.
043600	130	339	-63.1	.1737+03	.2882+03	-9999.
043700	126	339	-63.3	.1729+03	.2870+03	-9999.
043800	123	338	-63.6	.1720+03	.2859+03	-9999.
043900	119	338	-63.8	.1712+03	.2848+03	-9999.
044000	116	338	-64.0	.1703+03	.2837+03	-9999.
044100	113	338	-64.1	.1695+03	.2825+03	-9999.
044200	109	336	-64.2	.1687+03	.2812+03	-9999.
044300	107	335	-64.3	.1678+03	.2800+03	-9999.
044400	102	334	-64.4	.1670+03	.2787+03	-9999.
044500	103	331	-64.5	.1662+03	.2775+03	-9999.
044600	101	329	-64.7	.1654+03	.2763+03	-9999.
044700	100	327	-64.8	.1645+03	.2751+03	-9999.
044800	102	324	-64.9	.1637+03	.2738+03	-9999.
044900	100	326	-65.0	.1629+03	.2726+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
045000	098	326	-65.1	.1621+03	.2714+03	-9999.
045100	097	328	-65.1	.1613+03	.2700+03	-9999.
045200	097	326	-65.0	.1605+03	.2686+03	-9999.
045300	096	325	-64.9	.1597+03	.2672+03	-9999.
045400	097	321	-64.9	.1589+03	.2658+03	-9999.
045500	094	320	-64.8	.1581+03	.2645+03	-9999.
045600	091	319	-64.8	.1573+03	.2631+03	-9999.
045700	089	316	-64.7	.1566+03	.2617+03	-9999.
045800	090	313	-64.7	.1558+03	.2604+03	-9999.
045900	089	312	-64.6	.1550+03	.2590+03	-9999.
046000	093	310	-64.6	.1542+03	.2577+03	-9999.
046100	094	310	-64.7	.1535+03	.2565+03	-9999.
046200	094	309	-64.8	.1527+03	.2550+03	-9999.
046300	098	307	-64.9	.1520+03	.2542+03	-9999.
046400	100	306	-65.0	.1512+03	.2531+03	-9999.
046500	100	307	-65.1	.1505+03	.2519+03	-9999.
046600	103	306	-65.2	.1497+03	.2508+03	-9999.
046700	105	305	-65.3	.1490+03	.2497+03	-9999.
046800	105	306	-65.4	.1482+03	.2486+03	-9999.
046900	106	305	-65.5	.1475+03	.2475+03	-9999.
047000	107	305	-65.6	.1468+03	.2463+03	-9999.
047100	109	305	-65.8	.1460+03	.2453+03	-9999.
047200	109	304	-66.0	.1453+03	.2443+03	-9999.
047300	112	304	-66.1	.1446+03	.2433+03	-9999.
047400	109	306	-66.3	.1439+03	.2423+03	-9999.
047500	112	306	-66.5	.1431+03	.2413+03	-9999.
047600	109	308	-66.7	.1424+03	.2403+03	-9999.
047700	110	308	-66.9	.1417+03	.2393+03	-9999.
047800	106	311	-67.0	.1410+03	.2383+03	-9999.
047900	107	311	-67.2	.1403+03	.2373+03	-9999.
048000	105	312	-67.4	.1396+03	.2364+03	-9999.
048100	104	312	-67.6	.1389+03	.2354+03	-9999.
048200	099	316	-67.7	.1382+03	.2344+03	-9999.
048300	102	314	-67.9	.1375+03	.2334+03	-9999.
048400	101	315	-68.0	.1368+03	.2324+03	-9999.
048500	101	316	-68.2	.1361+03	.2314+03	-9999.
048600	101	316	-68.4	.1354+03	.2304+03	-9999.
048700	102	317	-68.5	.1348+03	.2294+03	-9999.
048800	104	318	-68.7	.1341+03	.2284+03	-9999.
048900	106	321	-68.8	.1334+03	.2275+03	-9999.
049000	107	323	-69.0	.1327+03	.2265+03	-9999.
049100	102	330	-69.0	.1321+03	.2253+03	-9999.
049200	101	331	-69.0	.1314+03	.2242+03	-9999.
049300	101	335	-69.0	.1307+03	.2230+03	-9999.
049400	100	336	-69.0	.1301+03	.2219+03	-9999.
049500	097	336	-68.9	.1294+03	.2208+03	-9999.
049600	093	338	-68.9	.1288+03	.2197+03	-9999.
049700	090	341	-68.9	.1281+03	.2185+03	-9999.
049800	086	343	-68.9	.1275+03	.2174+03	-9999.
049900	082	341	-68.9	.1268+03	.2163+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050000	078	344	-68.9	.1262+03	.2152+03	-9999.
050100	075	344	-68.8	.1255+03	.2141+03	-9999.
050200	072	343	-68.8	.1249+03	.2129+03	-9999.
050300	067	346	-68.7	.1243+03	.2118+03	-9999.
050400	063	344	-68.7	.1237+03	.2106+03	-9999.
050500	060	340	-68.6	.1230+03	.2095+03	-9999.
050600	056	345	-68.5	.1224+03	.2084+03	-9999.
050700	055	338	-68.5	.1218+03	.2073+03	-9999.
050800	051	339	-68.4	.1212+03	.2062+03	-9999.
050900	046	336	-68.4	.1206+03	.2051+03	-9999.
051000	045	336	-68.3	.1199+03	.2040+03	-9999.
051100	044	333	-68.4	.1193+03	.2031+03	-9999.
051200	041	328	-68.6	.1187+03	.2022+03	-9999.
051300	041	326	-68.7	.1181+03	.2013+03	-9999.
051400	039	326	-68.8	.1175+03	.2004+03	-9999.
051500	040	318	-68.9	.1170+03	.1995+03	-9999.
051600	040	314	-69.1	.1164+03	.1986+03	-9999.
051700	039	313	-69.2	.1158+03	.1978+03	-9999.
051800	038	313	-69.3	.1152+03	.1969+03	-9999.
051900	041	306	-69.5	.1146+03	.1960+03	-9999.
052000	040	305	-69.6	.1140+03	.1952+03	-9999.
052100	041	307	-69.8	.1134+03	.1943+03	-9999.
052200	044	302	-69.9	.1129+03	.1935+03	-9999.
052300	047	300	-70.1	.1123+03	.1927+03	-9999.
052400	050	301	-70.3	.1117+03	.1919+03	-9999.
052500	051	302	-70.4	.1112+03	.1910+03	-9999.
052600	056	302	-70.6	.1106+03	.1902+03	-9999.
052700	057	305	-70.8	.1100+03	.1894+03	-9999.
052800	062	307	-71.0	.1095+03	.1886+03	-9999.
052900	064	311	-71.1	.1089+03	.1878+03	-9999.
053000	066	315	-71.3	.1084+03	.1870+03	-9999.
053100	064	321	-71.4	.1078+03	.1862+03	-9999.
053200	062	323	-71.5	.1073+03	.1853+03	-9999.
053300	059	329	-71.6	.1067+03	.1845+03	-9999.
053400	057	330	-71.7	.1062+03	.1836+03	-9999.
053500	054	331	-71.8	.1056+03	.1828+03	-9999.
053600	052	324	-72.0	.1051+03	.1819+03	-9999.
053700	049	326	-72.1	.1045+03	.1811+03	-9999.
053800	047	325	-72.2	.1040+03	.1803+03	-9999.
053900	047	318	-72.3	.1035+03	.1795+03	-9999.
054000	046	316	-72.4	.1029+03	.1786+03	-9999.
054100	044	314	-72.3	.1024+03	.1776+03	-9999.
054200	046	309	-72.1	.1019+03	.1766+03	-9999.
054300	047	308	-72.0	.1014+03	.1755+03	-9999.
054400	046	310	-71.8	.1008+03	.1745+03	-9999.
054500	050	309	-71.7	.1003+03	.1735+03	-9999.
054600	050	313	-71.6	.9982+02	.1725+03	-9999.
054700	053	312	-71.4	.9931+02	.1715+03	-9999.
054800	051	316	-71.3	.9880+02	.1705+03	-9999.
054900	048	318	-71.1	.9829+02	.1695+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
055000	042	319	-71.0	.9779+02	.1685+03	-9999.
055100	039	321	-71.2	.9729+02	.1678+03	-9999.
055200	037	325	-71.4	.9679+02	.1671+03	-9999.
055300	035	323	-71.6	.9629+02	.1664+03	-9999.
055400	032	330	-71.8	.9580+02	.1657+03	-9999.
055500	032	324	-72.0	.9531+02	.1651+03	-9999.
055600	028	326	-72.2	.9482+02	.1644+03	-9999.
055700	026	328	-72.4	.9433+02	.1637+03	-9999.
055800	024	334	-72.6	.9385+02	.1630+03	-9999.
055900	024	334	-72.8	.9337+02	.1623+03	-9999.
056000	026	337	-73.0	.9289+02	.1617+03	-9999.
057000	031	328	-72.8	.8822+02	.1534+03	-9999.
058000	025	331	-73.8	.8377+02	.1464+03	-9999.
059000	019	329	-74.4	.7954+02	.1394+03	-9999.
060000	019	312	-74.5	.7551+02	.1324+03	-9999.
061000	022	314	-72.5	.7170+02	.1245+03	-9999.
062000	021	321	-68.8	.6814+02	.1162+03	-9999.
063000	017	320	-66.7	.6480+02	.1093+03	-9999.
064000	014	308	-65.7	.6164+02	.1035+03	-9999.
065000	018	293	-65.4	.5865+02	.9835+02	-9999.
066000	015	295	-66.0	.5580+02	.9384+02	-9999.
067000	016	304	-65.7	.5309+02	.8915+02	-9999.
068000	018	315	-63.9	.5052+02	.8411+02	-9999.
069000	019	327	-63.4	.4809+02	.7987+02	-9999.
070000	016	332	-63.1	.4579+02	.7594+02	-9999.
071000	013	333	-62.6	.4359+02	.7212+02	-9999.
072000	011	337	-61.6	.4151+02	.6836+02	-9999.
073000	011	354	-60.2	.3954+02	.6468+02	-9999.
074000	010	019	-59.0	.3767+02	.6128+02	-9999.
075000	009	024	-59.9	.3590+02	.5865+02	-9999.
076000	009	022	-59.4	.3421+02	.5576+02	-9999.
077000	010	015	-58.2	.3260+02	.5283+02	-9999.
078000	009	011	-57.5	.3107+02	.5019+02	-9999.
079000	009	014	-56.5	.2962+02	.4763+02	-9999.
080000	010	027	-55.6	.2825+02	.4524+02	-9999.
081000	010	030	-54.6	.2695+02	.4296+02	-9999.
082000	009	023	-54.0	.2571+02	.4087+02	-9999.
083000	009	008	-53.6	.2453+02	.3892+02	-9999.
084000	010	349	-52.6	.2340+02	.3696+02	-9999.
085000	011	323	-50.9	.2234+02	.3502+02	-9999.
086000	013	303	-50.0	.2133+02	.3330+02	-9999.
087000	016	288	-49.5	.2037+02	.3173+02	-9999.
088000	020	277	-48.6	.1945+02	.3017+02	-9999.
089000	025	268	-47.6	.1858+02	.2870+02	-9999.
090000	030	263	-47.0	.1775+02	.2734+02	-9999.
091000	033	261	-46.5	.1696+02	.2607+02	-9999.
092000	035	264	-44.8	.1630+02	.2487+02	-9999.
093000	037	259	-42.0	.1580+02	.2381+02	-9999.
094000	038	256	-39.7	.1520+02	.2269+02	-9999.
095000	042	254	-37.5	.1455+02	.2152+02	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
096000	048	252	-36.5	.1393+02	.2052+02	-9999.
097000	055	253	-36.0	.1334+02	.1960+02	-9999.
098000	059	255	-35.6	.1277+02	.1873+02	-9999.
099000	064	257	-34.8	.1223+02	.1788+02	-9999.
100000	067	257	-33.1	.1172+02	.1701+02	-9999.
101000	069	259	-31.0	.1123+02	.1616+02	-9999.
102000	069	259	-29.1	.1076+02	.1536+02	-9999.
103000	069	258	-27.3	.1032+02	.1463+02	-9999.
104000	070	257	-27.1	.9898+01	.1401+02	-9999.
105000	072	262	-28.3	.9492+01	.1351+02	-9999.
106000	074	259	-30.0	.9100+01	.1304+02	-9999.
107000	076	258	-31.4	.8722+01	.1257+02	-9999.
108000	076	261	-31.7	.8358+01	.1206+02	-9999.
109000	077	267	-30.4	.8010+01	.1149+02	-9999.
110000	081	258	-28.1	.7680+01	.1092+02	-9999.
111000	086	260	-25.8	.7365+01	.1037+02	-9999.
112000	094	265	-23.6	.7067+01	.9865+01	-9999.
113000	098	270	-22.3	.6782+01	.9419+01	-9999.
114000	104	273	-22.0	.6510+01	.9031+01	-9999.
115000	108	276	-21.8	.6249+01	.8662+01	-9999.
116000	109	279	-21.3	.5999+01	.8298+01	-9999.
117000	109	281	-20.2	.5760+01	.7933+01	-9999.
118000	109	282	-19.1	.5531+01	.7583+01	-9999.
119000	104	282	-17.9	.5312+01	.7251+01	-9999.
120000	096	280	-16.8	.5103+01	.6935+01	-9999.
121000	092	278	-15.9	.4903+01	.6640+01	-9999.
122000	092	272	-15.5	.4711+01	.6371+01	-9999.
123000	094	266	-15.3	.4527+01	.6117+01	-9999.
124000	096	261	-15.1	.4350+01	.5874+01	-9999.
125000	097	257	-15.0	.4181+01	.5641+01	-9999.
126000	096	255	-14.7	.4018+01	.5416+01	-9999.
127000	094	257	-14.2	.3861+01	.5194+01	-9999.
128000	096	259	-13.7	.3711+01	.4984+01	-9999.
129000	099	260	-13.8	.3567+01	.4792+01	-9999.
130000	106	259	-14.0	.3429+01	.4609+01	-9999.
131000	111	259	-14.2	.3296+01	.4434+01	-9999.
132000	114	259	-14.4	.3168+01	.4265+01	-9999.
133000	118	258	-14.6	.3044+01	.4102+01	-9999.
134000	123	258	-14.7	.2926+01	.3945+01	-9999.
135000	130	260	-15.0	.2812+01	.3794+01	-9999.
136000	133	265	-15.1	.2703+01	.3649+01	-9999.
137000	135	271	-15.3	.2597+01	.3509+01	-9999.
138000	136	276	-15.5	.2496+01	.3374+01	-9999.
139000	138	279	-15.7	.2398+01	.3245+01	-9999.
140000	140	280	-15.8	.2305+01	.3120+01	-9999.
141000	143	280	-15.5	.2215+01	.2995+01	-9999.
142000	148	279	-14.6	.2129+01	.2868+01	-9999.
143000	153	278	-13.4	.2046+01	.2744+01	-9999.
144000	155	277	-12.1	.1967+01	.2625+01	-9999.
145000	158	276	-11.3	.1891+01	.2516+01	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
146000	160	275	-11.3	.1819+01	.2420+01	-9999.
147000	162	273	-11.6	.1749+01	.2330+01	-9999.
148000	163	270	-11.4	.1682+01	.2239+01	-9999.
149000	167	267	-9.7	.1618+01	.2139+01	-9999.
150000	168	266	-8.0	.1556+01	.2045+01	-9999.
151000	172	265	-6.5	.1497+01	.1956+01	-9999.
152000	175	264	-5.7	.1441+01	.1877+01	-9999.
153000	177	264	-5.1	.1387+01	.1802+01	-9999.
154000	180	264	-4.9	.1335+01	.1734+01	-9999.
155000	180	264	-4.8	.1285+01	.1668+01	-9999.
156000	180	264	-4.7	.1237+01	.1605+01	-9999.
157000	180	263	-4.5	.1191+01	.1544+01	-9999.
158000	182	261	-4.4	.1146+01	.1485+01	-9999.
159000	184	260	-4.2	.1103+01	.1429+01	-9999.
160000	187	259	-4.1	.1062+01	.1375+01	-9999.
161000	190	258	-4.0	.1022+01	.1323+01	-9999.
162000	194	258	-3.9	.9842+00	.1273+01	-9999.
163000	199	258	-3.7	.9475+00	.1225+01	-9999.
164000	202	260	-3.7	.9122+00	.1179+01	-9999.
165000	207	263	-3.4	.8783+00	.1134+01	-9999.
166000	217	261	-3.4	.8456+00	.1092+01	-9999.
167000	233	262	-3.3	.8141+00	.1051+01	-9999.
168000	234	264	-3.1	.7838+00	.1011+01	-9999.
169000	217	266	-3.1	.7547+00	.9735+00	-9999.
170000	209	264	-3.0	.7267+00	.9370+00	-9999.
171000	216	264	-3.3	.6997+00	.9033+00	-9999.
172000	228	263	-3.5	.6737+00	.8705+00	-9999.
173000	239	262	-3.8	.6486+00	.8389+00	-9999.
174000	246	261	-4.1	.6244+00	.8086+00	-9999.
175000	246	261	-4.4	.6011+00	.7792+00	-9999.
176000	248	261	-4.4	.5787+00	.7502+00	-9999.
177000	246	261	-3.9	.5571+00	.7208+00	-9999.
178000	246	260	-3.3	.5364+00	.6925+00	-9999.
179000	249	263	-2.7	.5165+00	.6653+00	-9999.
180000	246	264	-2.1	.4974+00	.6394+00	-9999.
181000	239	265	-1.5	.4790+00	.6143+00	-9999.
182000	241	265	-1.2	.4613+00	.5909+00	-9999.
183000	251	261	-.5	.4444+00	.5678+00	-9999.
184000	268	257	-.1	.4280+00	.5460+00	-9999.
185000	271	254	.5	.4123+00	.5249+00	-9999.
186000	261	253	-.3	.3972+00	.5072+00	-9999.
187000	248	255	-1.9	.3826+00	.4913+00	-9999.
188000	243	260	-3.5	.3684+00	.4759+00	-9999.
189000	244	262	-5.0	.3547+00	.4607+00	-9999.
190000	246	263	-6.4	.3414+00	.4458+00	-9999.
191000	249	262	-7.9	.3286+00	.4316+00	-9999.
192000	249	256	-9.4	.3161+00	.4175+00	-9999.
193000	253	250	-10.7	.3041+00	.4036+00	-9999.
194000	261	247	-11.5	.2925+00	.3894+00	-9999.
195000	260	245	-12.0	.2813+00	.3752+00	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
196000	248	247	-12.1	.2705+00	.3610+00	-9999.
197000	229	252	-12.4	.2602+00	.3476+00	-9999.
198000	216	254	-12.6	.2502+00	.3345+00	-9999.
199000	214	255	-12.8	.2406+00	.3219+00	-9999.
200000	219	255	-13.0	.2313+00	.3097+00	-9999.
201000	226	256	-13.7	.2224+00	.2986+00	-9999.
202000	226	256	-13.9	.2139+00	.2874+00	-9999.
203000	218	255	-14.0	.2056+00	.2764+00	-9999.
204000	199	255	-14.0	.1977+00	.2657+00	-9999.
205000	185	254	-12.8	.1901+00	.2544+00	-9999.
206000	175	254	-11.9	.1828+00	.2438+00	-9999.
207000	175	255	-13.3	.1758+00	.2357+00	-9999.
208000	177	259	-14.9	.1690+00	.2280+00	-9999.
209000	180	263	-16.7	.1624+00	.2206+00	-9999.
210000	184	267	-18.8	.1561+00	.2138+00	-9999.
211000	187	271	-20.8	.1499+00	.2070+00	-9999.
212000	187	273	-22.1	.1440+00	.1998+00	-9999.
213000	189	272	-23.0	.1383+00	.1926+00	-9999.
214000	195	272	-24.3	.1327+00	.1858+00	-9999.
215000	208	271	-25.5	.1274+00	.1792+00	-9999.
216000	212	271	-26.4	.1223+00	.1727+00	-9999.
217000	221	272	-27.8	.1173+00	.1665+00	-9999.
218000	229	274	-29.2	.1125+00	.1607+00	-9999.
219000	234	276	-31.2	.1079+00	.1554+00	-9999.
220000	238	278	-34.1	.1020+00	.1486+00	-9999.
221000	236	279	-35.2	.9600-01	.1405+00	-9999.
222000	234	279	-36.3	.9000-01	.1324+00	-9999.
223000	229	277	-39.2	.8400-01	.1251+00	-9999.
224000	226	274	-42.2	.7800-01	.1177+00	-9999.
225000	224	271	-47.2	.7200-01	.1110+00	-9999.
226000	229	267	-52.2	.6600-01	.1041+00	-9999.
227000	229	267	-57.1	.6000-01	.9675-01	-9999.
228000	234	269	-60.4	.5500-01	.9332-01	-9999.
229000	239	271	-63.1	.5400-01	.8958-01	-9999.
230000	243	273	-66.2	.5100-01	.8587-01	-9999.
231000	246	274	-69.2	.4800-01	.8201-01	-9999.
232000	246	275	-71.7	.4530-01	.7835-01	-9999.
233000	244	275	-73.3	.4300-01	.7496-01	-9999.
234000	243	276	-74.8	.4090-01	.7182-01	-9999.
235000	238	275	-76.3	.3890-01	.6884-01	-9999.
236000	231	275	-77.8	.3690-01	.6581-01	-9999.
237000	222	275	-78.3	.3500-01	.6259-01	-9999.
238000	214	274	-79.2	.3320-01	.5962-01	-9999.
239000	204	273	-79.2	.3160-01	.5679-01	-9999.
240000	194	272	-79.8	.2990-01	.5384-01	-9999.
241000	182	270	-80.2	.2840-01	.5126-01	-9999.
242000	170	269	-81.0	.2700-01	.4894-01	-9999.
243000	158	267	-81.2	.2560-01	.4645-01	-9999.
244000	146	265	-81.2	.2430-01	.4409-01	-9999.
245000	135	262	-81.2	.2300-01	.4173-01	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
246000	123	259	-81.2	.2180-01	.3955-01	-9999.
247000	111	256	-82.2	.2070-01	.3776-01	-9999.
248000	101	252	-82.2	.1960-01	.3575-01	-9999.
249000	091	247	-83.2	.1860-01	.3410-01	-9999.
250000	082	242	-83.2	.1770-01	.3245-01	-9999.
251000	074	235	-82.6	.1680-01	.3072-01	-9999.
252000	065	227	-82.2	.1590-01	.2900-01	-9999.
253000	060	217	-82.2	.1510-01	.2754-01	-9999.
254000	057	206	-81.2	.1430-01	.2595-01	-9999.
255000	055	195	-80.5	.1360-01	.2460-01	-9999.
256000	057	185	-80.2	.1290-01	.2328-01	-9999.
257000	060	176	-78.5	.1220-01	.2183-01	-9999.
258000	064	169	-77.2	.1160-01	.2062-01	-9999.
259000	067	162	-75.4	.1100-01	.1938-01	-9999.
260000	072	157	-74.2	.1050-01	.1838-01	-9999.
261000	077	153	-72.4	.1000-01	.1735-01	-9999.
262000	081	149	-71.2	.9500-02	.1638-01	-9999.
263000	084	147	-70.3	.9000-02	.1546-01	-9999.
264000	087	145	-68.8	.8600-02	.1466-01	-9999.
265000	091	143	-67.3	.8200-02	.1388-01	-9999.
266000	092	142	-66.8	.7800-02	.1317-01	-9999.
267000	092	142	-66.2	.7400-02	.1245-01	-9999.
268000	092	141	-65.2	.7000-02	.1172-01	-9999.
269000	091	141	-64.2	.6700-02	.1117-01	-9999.
270000	089	142	-64.2	.6400-02	.1067-01	-9999.
271000	086	143	-63.2	.6100-02	.1012-01	-9999.
272000	082	144	-61.6	.5800-02	.9552-02	-9999.
273000	077	147	-61.1	.5500-02	.9036-02	-9999.
274000	072	150	-59.6	.5300-02	.8645-02	-9999.
275000	065	154	-59.2	.5000-02	.8139-02	-9999.
276000	060	160	-59.2	.4800-02	.7814-02	-9999.
277000	055	168	-59.3	.4500-02	.7331-02	-9999.
278000	051	168	-60.6	.4303-02	.7010-02	-9999.
279000	048	169	-61.9	.4115-02	.6703-02	-9999.
280000	044	169	-63.1	.3935-02	.6410-02	-9999.
281000	041	170	-64.4	.3763-02	.6129-02	-9999.
282000	037	171	-65.7	.3598-02	.5861-02	-9999.
283000	034	173	-67.0	.3440-02	.5605-02	-9999.
284000	031	174	-68.3	.3290-02	.5359-02	-9999.
285000	027	176	-69.6	.3146-02	.5125-02	-9999.
286000	024	179	-70.8	.3008-02	.4901-02	-9999.
287000	020	182	-72.1	.2877-02	.4686-02	-9999.
288000	017	187	-73.4	.2751-02	.4481-02	-9999.
289000	014	194	-74.7	.2630-02	.4285-02	-9999.
290000	011	204	-76.0	.2515-02	.4098-02	-9999.
291000	009	220	-77.2	.2405-02	.3918-02	-9999.
292000	008	242	-78.5	.2300-02	.3747-02	-9999.
295000	018	246	-79.1	.1970-02	.3746-02	-9999.
298000	028	249	-78.5	.1692-02	.3025-02	-9999.
301000	039	275	-77.4	.1447-02	.2566-02	-9999.

TABLE 4. (Concluded)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
304000	117	272	-76.2	.1238-02	.2177-02	-9999.
307000	150	271	-75.0	.1059-02	.1847-02	-9999.
310000	164	270	-73.8	.9052-03	.1567-02	-9999.
313000	160	269	-72.2	.7765-03	.1330-02	-9999.
316000	158	269	-70.1	.6648-03	.1130-02	-9999.
319000	152	269	-68.0	.5760-03	.9603-03	-9999.
322000	138	269	-65.9	.4960-03	.8159-03	-9999.
325000	118	269	-63.8	.4271-03	.6931-03	-9999.
328000	077	268	-61.7	.3677-03	.5889-03	-9999.
331000	071	269	-58.3	.3178-03	.4999-03	-9999.
334000	062	268	-55.0	.2747-03	.4244-03	-9999.
337000	047	266	-51.7	.2374-03	.3602-03	-9999.
340000	025	262	-48.3	.2051-03	.3058-03	-9999.
343000	007	130	-45.0	.1771-03	.2596-03	-9999.
346000	027	097	-40.6	.1542-03	.2211-03	-9999.
349000	030	099	-35.2	.1351-03	.1890-03	-9999.
352000	033	101	-29.8	.1184-03	.1615-03	-9999.
355000	036	103	-24.4	.1037-03	.1380-03	-9999.
358000	040	106	-19.0	.9076-04	.1180-03	-9999.
361000	043	099	-13.5	.7948-04	.1009-03	-9999.
364000	045	102	-5.3	.7196-04	.8771-04	-9999.
367000	048	105	2.8	.6418-04	.7625-04	-9999.
370000	050	109	10.9	.5760-04	.6629-04	-9999.
373000	052	114	19.1	.5165-04	.5763-04	-9999.
376000	054	120	27.2	.4628-04	.5010-04	-9999.
379000	048	109	36.4	.4188-04	.4389-04	-9999.
382000	046	112	46.6	.3832-04	.3877-04	-9999.
385000	046	115	57.1	.3517-04	.3436-04	-9999.
388000	045	119	68.0	.3237-04	.3054-04	-9999.
391000	045	121	79.2	.2989-04	.2724-04	-9999.
394000	044	125	90.6	.2768-04	.2437-04	-9999.
397000	044	129	102.2	.2570-04	.2187-04	-9999.
400000	045	132	114.0	.2392-04	.1969-04	-9999.

TABLE 5. STS-5 FINAL SRB DESCENT METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000060	037	020	23.9	.1021+04	.1188+04	18.3
001000	030	059	22.9	.9872+03	.1153+04	16.1
002000	030	063	19.6	.9532+03	.1127+04	14.9
003000	031	056	16.2	.9199+03	.1101+04	13.2
004000	034	044	12.2	.8875+03	.1078+04	9.5
005000	035	044	10.9	.8558+03	.1044+04	9.3
006000	033	056	8.8	.8251+03	.1015+04	5.5
007000	033	058	8.5	.7953+03	.9825+03	-10.4
008000	033	054	9.6	.7666+03	.9481+03	-22.8
009000	032	051	9.5	.7390+03	.9100+03	-15.5
010000	030	051	7.7	.7123+03	.8828+03	-16.9
011000	030	050	6.2	.6864+03	.8553+03	-17.9
012000	032	034	4.4	.6613+03	.8295+03	-21.3
013000	035	020	4.3	.6370+03	.7994+03	-22.4
014000	032	017	.3	.6134+03	.7818+03	-22.4
015000	030	015	-1.5	.5905+03	.7569+03	-25.0
016000	035	002	-3.9	.5683+03	.7350+03	-26.8
017000	044	350	-4.4	.5468+03	.7087+03	-34.9
018000	045	343	-5.4	.5261+03	.6944+03	-35.6
019000	045	343	-6.4	.5061+03	.6608+03	-36.2
020000	051	345	-7.5	.4867+03	.6382+03	-36.2
021000	057	345	-9.4	.4680+03	.6181+03	-35.7
022000	064	345	-11.4	.4499+03	.5987+03	-34.9
023000	067	346	-14.6	.4323+03	.5829+03	-36.1
024000	069	348	-16.7	.4153+03	.5640+03	-36.7
025000	064	347	-19.8	.3987+03	.5482+03	-37.8
026000	065	347	-22.4	.3827+03	.5320+03	-37.7
027000	059	348	-23.3	.3672+03	.5119+03	-42.8
028000	064	347	-25.5	.3522+03	.4953+03	-44.1
029000	080	348	-27.2	.3377+03	.4783+03	-45.7
030000	098	348	-29.4	.3237+03	.4626+03	-47.6
031000	110	348	-31.1	.3102+03	.4464+03	-49.1
032000	117	349	-33.9	.2971+03	.4326+03	-51.3
033000	120	349	-35.7	.2845+03	.4173+03	-52.9
034000	118	348	-38.1	.2723+03	.4035+03	-54.6
035000	124	344	-40.4	.2605+03	.3899+03	-55.7
036000	134	340	-42.9	.2491+03	.3769+03	-57.7
037000	140	339	-45.0	.2381+03	.3635+03	-59.4
038000	141	339	-46.2	.2275+03	.3492+03	-60.4
039000	133	338	-48.6	.2173+03	.3371+03	-62.2
040000	132	338	-50.2	.2075+03	.3242+03	-63.3
041000	147	340	-52.1	.1980+03	.3121+03	-64.7
042000	153	340	-54.5	.1889+03	.3010+03	-66.6
043000	140	339	-56.6	.1801+03	.2898+03	-68.2
044000	121	337	-58.7	.1717+03	.2789+03	-70.2
045000	106	334	-5[illegible]	.1636+03	.2658+03	-70.4
046000	103	332	-58.3	.1559+03	.2528+03	-70.1
047000	105	332	-58.6	.1486+03	.2412+03	-70.4
048000	106	333	-59.2	.1416+03	.2305+03	-9999.
049000	107	333	-60.5	.1349+03	.2209+03	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050000	106	333	-61.1	.1284+03	.2110+03	-9999.
051000	101	332	-62.2	.1223+03	.2020+03	-9999.
052000	097	332	-62.7	.1165+03	.1928+03	-9999.
053000	089	333	-63.4	.1109+03	.1841+03	-9999.
054000	078	334	-62.9	.1055+03	.1749+03	-9999.
055000	076	334	-62.6	.1005+03	.1663+03	-9999.
056000	075	334	-63.0	.9567+02	.1586+03	-9999.
057000	073	335	-63.3	.9108+02	.1512+03	-9999.
058000	073	335	-64.2	.8669+02	.1445+03	-9999.
059000	075	335	-64.4	.8251+02	.1377+03	-9999.
060000	078	336	-64.4	.7852+02	.1310+03	-9999.
061000	078	335	-64.1	.7473+02	.1245+03	-9999.
062000	075	335	-63.1	.7119+02	.1180+03	-9999.
063000	074	335	-62.2	.6773+02	.1119+03	-9999.
064000	077	334	-61.2	.6450+02	.1060+03	-9999.
065000	080	335	-59.9	.6144+02	.1004+03	-9999.
066000	080	336	-58.7	.5855+02	.9511+02	-9999.
067000	075	336	-57.6	.5580+02	.9018+02	-9999.
068000	066	333	-56.5	.5320+02	.8554+02	-9999.
069000	059	328	-55.6	.5073+02	.8124+02	-9999.
070000	054	327	-54.9	.4838+02	.7722+02	-9999.
071000	049	328	-53.8	.4615+02	.7329+02	-9999.
072000	049	330	-53.0	.4403+02	.6967+02	-9999.
073000	053	333	-52.1	.4202+02	.6622+02	-9999.
074000	051	333	-51.0	.4011+02	.6290+02	-9999.
075000	047	331	-50.1	.3829+02	.5980+02	-9999.
076000	047	329	-49.4	.3656+02	.5692+02	-9999.
077000	049	329	-48.6	.3492+02	.5418+02	-9999.
078000	052	331	-47.9	.3335+02	.5158+02	-9999.
079000	053	333	-47.2	.3186+02	.4912+02	-9999.
080000	050	333	-46.0	.3044+02	.4668+02	-9999.
081000	047	330	-45.1	.2909+02	.4444+02	-9999.
082000	048	332	-44.2	.2781+02	.4232+02	-9999.
083000	050	333	-43.5	.2659+02	.4034+02	-9999.
084000	047	332	-42.7	.2542+02	.3843+02	-9999.
085000	045	329	-41.9	.2431+02	.3662+02	-9999.
086000	041	327	-41.3	.2325+02	.3493+02	-9999.
087000	040	325	-40.8	.2224+02	.3334+02	-9999.
088000	040	320	-40.2	.2128+02	.3182+02	-9999.
089000	041	315	-39.4	.2036+02	.3034+02	-9999.
090000	041	310	-38.9	.1948+02	.2885+02	-9999.
091000	042	305	-38.5	.1863+02	.2717+02	-9999.
092000	040	300	-38.0	.1780+02	.2578+02	-9999.
093000	038	295	-37.9	.1698+02	.2440+02	-9999.
094000	038	290	-37.6	.1550+02	.2292+02	-9999.
095000	042	285	-37.0	.1470+02	.2169+02	-9999.
096000	048	280	-36.5	.1393+02	.2052+02	-9999.
097000	055	275	-36.0	.1330+02	.1960+02	-9999.
098000	059	270	-35.6	.1277+02	.1873+02	-9999.
099000	064	265	-34.8	.1223+02	.1762+02	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
100000	067	260	-33.1	.1172+02	.1701+02	-9999.
101000	069	259	-31.0	.1123+02	.1616+02	-9999.
102000	069	259	-29.1	.1076+02	.1536+02	-9999.
103000	069	258	-27.3	.1032+02	.1463+02	-9999.
104000	070	257	-27.1	.9898+01	.1401+02	-9999.
105000	072	242	-28.3	.9492+01	.1351+02	-9999.
106000	074	239	-30.0	.9100+01	.1304+02	-9999.
107000	076	238	-31.4	.8722+01	.1257+02	-9999.
108000	076	241	-31.7	.8358+01	.1206+02	-9999.
109000	077	247	-30.4	.8010+01	.1146+02	-9999.
110000	081	254	-28.1	.7680+01	.1092+02	-9999.
111000	086	260	-25.8	.7365+01	.1037+02	-9999.
112000	094	265	-23.6	.7067+01	.9865+01	-9999.
113000	099	270	-22.3	.6782+01	.9419+01	-9999.
114000	104	273	-22.0	.6510+01	.9031+01	-9999.
115000	108	276	-21.8	.6249+01	.8662+01	-9999.
116000	109	279	-21.3	.5999+01	.8290+01	-9999.
117000	109	281	-20.2	.5760+01	.7933+01	-9999.
118000	109	282	-19.1	.5531+01	.7583+01	-9999.
119000	109	282	-17.9	.5312+01	.7251+01	-9999.
120000	096	280	-16.8	.5103+01	.6935+01	-9999.
121000	092	278	-15.9	.4903+01	.6640+01	-9999.
122000	092	272	-15.5	.4711+01	.6371+01	-9999.
123000	094	266	-15.3	.4527+01	.6117+01	-9999.
124000	096	261	-15.1	.4350+01	.5874+01	-9999.
125000	097	257	-15.0	.4181+01	.5641+01	-9999.
126000	096	255	-14.7	.4018+01	.5416+01	-9999.
127000	094	257	-14.2	.3861+01	.5194+01	-9999.
128000	096	259	-13.7	.3711+01	.4988+01	-9999.
129000	099	260	-13.8	.3567+01	.4792+01	-9999.
130000	106	259	-14.0	.3429+01	.4609+01	-9999.
131000	111	259	-14.2	.3296+01	.4434+01	-9999.
132000	114	258	-14.4	.3168+01	.4265+01	-9999.
133000	118	258	-14.6	.3044+01	.4102+01	-9999.
134000	123	258	-14.7	.2926+01	.3945+01	-9999.
135000	130	260	-15.0	.2812+01	.3794+01	-9999.
136000	133	265	-15.1	.2703+01	.3649+01	-9999.
137000	135	271	-15.3	.2597+01	.3509+01	-9999.
138000	136	276	-15.5	.2496+01	.3374+01	-9999.
139000	138	279	-15.7	.2398+01	.3245+01	-9999.
140000	140	280	-15.8	.2305+01	.3120+01	-9999.
141000	143	280	-15.5	.2215+01	.2995+01	-9999.
142000	148	279	-14.6	.2129+01	.2868+01	-9999.
143000	153	278	-13.4	.2046+01	.2744+01	-9999.
144000	155	277	-12.1	.1967+01	.2625+01	-9999.
145000	158	276	-11.3	.1891+01	.2516+01	-9999.
146000	160	275	-11.3	.1819+01	.2420+01	-9999.
147000	162	273	-11.6	.1749+01	.2330+01	-9999.
148000	163	270	-11.4	.1682+01	.2239+01	-9999.
149000	167	267	-9.7	.1618+01	.2139+01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
150000	168	266	-6.0	.1556+01	.2045+01	-9999.
151000	172	265	-6.5	.1497+01	.1956+01	-9999.
152000	175	264	-5.7	.1441+01	.1877+01	-9999.
153000	177	264	-5.1	.1387+01	.1802+01	-9999.
154000	180	264	-4.9	.1335+01	.1734+01	-9999.
155000	180	264	-4.8	.1285+01	.1668+01	-9999.
156000	180	264	-4.7	.1237+01	.1605+01	-9999.
157000	180	263	-4.5	.1191+01	.1544+01	-9999.
158000	182	261	-4.4	.1146+01	.1485+01	-9999.
159000	184	260	-4.2	.1103+01	.1429+01	-9999.
160000	187	259	-4.1	.1062+01	.1375+01	-9999.
161000	190	258	-4.0	.1022+01	.1323+01	-9999.
162000	194	258	-3.9	.9842+00	.1273+01	-9999.
163000	199	258	-3.7	.9475+00	.1225+01	-9999.
164000	202	260	-3.7	.9122+00	.1179+01	-9999.
165000	207	263	-3.4	.8783+00	.1134+01	-9999.
166000	217	261	-3.4	.8456+00	.1092+01	-9999.
167000	233	262	-3.3	.8141+00	.1051+01	-9999.
168000	234	264	-3.1	.7838+00	.1011+01	-9999.
169000	217	266	-3.1	.7547+00	.9735+00	-9999.
170000	209	264	-3.0	.7267+00	.9370+00	-9999.
171000	216	264	-3.3	.6997+00	.9033+00	-9999.
172000	228	263	-3.5	.6737+00	.8705+00	-9999.
173000	239	262	-3.8	.6486+00	.8389+00	-9999.
174000	246	261	-4.1	.6244+00	.8086+00	-9999.
175000	246	261	-4.4	.6011+00	.7792+00	-9999.
176000	248	261	-4.4	.5787+00	.7502+00	-9999.
177000	246	261	-3.9	.5571+00	.7208+00	-9999.
178000	246	260	-3.3	.5364+00	.6925+00	-9999.
179000	249	263	-2.7	.5165+00	.6653+00	-9999.
180000	246	264	-2.1	.4974+00	.6394+00	-9999.
181000	239	265	-1.5	.4790+00	.6143+00	-9999.
182000	241	265	-1.2	.4613+00	.5909+00	-9999.
183000	251	261	-.5	.4444+00	.5678+00	-9999.
184000	268	257	-.1	.4280+00	.5460+00	-9999.
185000	271	254	.5	.4123+00	.5249+00	-9999.
186000	261	253	-.3	.3972+00	.5072+00	-9999.
187000	248	255	-1.9	.3826+00	.4913+00	-9999.
188000	243	260	-3.5	.3684+00	.4759+00	-9999.
189000	244	262	-5.0	.3547+00	.4607+00	-9999.
190000	246	263	-6.4	.3414+00	.4458+00	-9999.
191000	249	262	-7.9	.3286+00	.4316+00	-9999.
192000	249	256	-9.4	.3161+00	.4175+00	-9999.
193000	253	250	-10.7	.3041+00	.4036+00	-9999.
194000	261	247	-11.5	.2925+00	.3894+00	-9999.
195000	260	245	-12.0	.2813+00	.3752+00	-9999.
196000	248	247	-12.1	.2705+00	.3610+00	-9999.
197000	229	252	-12.4	.2602+00	.3476+00	-9999.
198000	216	254	-12.6	.2502+00	.3345+00	-9999.
199000	214	255	-12.8	.2406+00	.3219+00	-9999.

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TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
200000	219	255	-13.0	.2313+00	.3097+00	-9999.
201000	226	256	-13.7	.2224+00	.2986+00	-9999.
202000	226	256	-13.9	.2139+00	.2874+00	-9999.
203000	214	255	-14.0	.2056+00	.2769+00	-9999.
204000	199	255	-14.0	.1977+00	.2657+00	-9999.
205000	185	254	-12.8	.1901+00	.2544+00	-9999.
206000	175	254	-11.9	.1828+00	.2438+00	-9999.
207000	175	255	-13.3	.1758+00	.2357+00	-9999.
208000	177	259	-14.9	.1690+00	.2280+00	-9999.
209000	180	263	-16.7	.1624+00	.2206+00	-9999.
210000	184	267	-18.8	.1561+00	.2138+00	-9999.
211000	187	271	-20.8	.1499+00	.2070+00	-9999.
212000	187	273	-22.1	.1440+00	.1998+00	-9999.
213000	189	272	-23.0	.1383+00	.1926+00	-9999.
214000	195	272	-24.3	.1327+00	.1858+00	-9999.
215000	204	271	-25.5	.1274+00	.1792+00	-9999.
216000	212	271	-26.4	.1223+00	.1727+00	-9999.
217000	221	272	-27.8	.1173+00	.1665+00	-9999.
218000	229	274	-29.2	.1125+00	.1607+00	-9999.
219000	234	276	-31.2	.1079+00	.1554+00	-9999.
220000	238	278	-34.1	.1020+00	.1486+00	-9999.
221000	236	279	-35.2	.9600-01	.1405+00	-9999.
222000	234	279	-36.3	.9000-01	.1324+00	-9999.
223000	229	277	-39.2	.8400-01	.1251+00	-9999.
224000	226	274	-42.2	.7800-01	.1177+00	-9999.
225000	224	271	-47.2	.7200-01	.1110+00	-9999.
226000	229	267	-52.2	.6600-01	.1041+00	-9999.
227000	229	267	-57.1	.6000-01	.9675-01	-9999.
228000	234	269	-60.4	.5700-01	.9332-01	-9999.
229000	239	271	-63.1	.5400-01	.8958-01	-9999.
230000	243	273	-66.2	.5100-01	.8587-01	-9999.
231000	246	274	-69.2	.4800-01	.8201-01	-9999.
232000	246	275	-71.7	.4530-01	.7835-01	-9999.
233000	244	275	-73.3	.4300-01	.7496-01	-9999.
234000	243	276	-74.8	.4090-01	.7182-01	-9999.
235000	238	275	-76.3	.3890-01	.6884-01	-9999.
236000	231	275	-77.8	.3690-01	.6581-01	-9999.
237000	222	275	-78.3	.3500-01	.6259-01	-9999.
238000	214	274	-79.2	.3320-01	.5962-01	-9999.
239000	204	273	-79.2	.3160-01	.5674-01	-9999.
240000	194	272	-79.8	.2990-01	.5388-01	-9999.
241000	182	270	-80.2	.2840-01	.5126-01	-9999.
242000	170	269	-81.0	.2700-01	.4894-01	-9999.
243000	158	267	-81.2	.2560-01	.4645-01	-9999.
244000	146	265	-81.2	.2430-01	.4409-01	-9999.
245000	135	262	-81.2	.2300-01	.4173-01	-9999.
246000	123	259	-81.2	.2180-01	.3955-01	-9999.
247000	113	256	-82.2	.2070-01	.3776-01	-9999.
248000	101	252	-82.2	.1960-01	.3575-01	-9999.
249000	091	247	-83.2	.1860-01	.3410-01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
250000	092	242	-83.2	.1770-01	.3245-01	-9999.
251000	079	235	-82.6	.1690-01	.3072-01	-9999.
252000	065	227	-82.2	.1590-01	.2900-01	-9999.
253000	060	217	-82.2	.1510-01	.2754-01	-9999.
254000	057	206	-81.2	.1430-01	.2595-01	-9999.
255000	055	195	-80.5	.1360-01	.2460-01	-9999.
256000	057	185	-80.2	.1290-01	.2328-01	-9999.
257000	060	176	-78.5	.1220-01	.2183-01	-9999.
258000	064	168	-77.2	.1160-01	.2062-01	-9999.
259000	067	162	-75.4	.1100-01	.1938-01	-9999.
260000	072	157	-74.2	.1050-01	.1838-01	-9999.
261000	077	153	-72.4	.1000-01	.1735-01	-9999.
262000	081	149	-71.2	.9500-02	.1638-01	-9999.
263000	084	147	-70.3	.9000-02	.1546-01	-9999.
264000	087	145	-68.8	.8600-02	.1466-01	-9999.
265000	091	143	-67.3	.8200-02	.1388-01	-9999.
266000	092	142	-66.8	.7800-02	.1317-01	-9999.
267000	092	142	-66.2	.7400-02	.1245-01	-9999.
268000	092	141	-65.2	.7000-02	.1172-01	-9999.
269000	091	141	-64.2	.6700-02	.1117-01	-9999.
270000	089	142	-64.2	.6400-02	.1067-01	-9999.
271000	086	143	-63.2	.6100-02	.1012-01	-9999.
272000	082	144	-61.6	.5800-02	.9552-02	-9999.
273000	077	147	-61.1	.5500-02	.9036-02	-9999.
274000	072	150	-59.6	.5300-02	.8645-02	-9999.
275000	065	154	-59.2	.5000-02	.8139-02	-9999.
276000	060	160	-59.2	.4800-02	.7814-02	-9999.
277000	055	168	-59.3	.4500-02	.7331-02	-9999.
278000	051	168	-60.6	.4303-02	.7010-02	-9999.
279000	048	169	-61.9	.4115-02	.6703-02	-9999.
280000	044	169	-63.1	.3935-02	.6410-02	-9999.
281000	041	170	-64.4	.3763-02	.6129-02	-9999.
282000	037	171	-65.7	.3598-02	.5861-02	-9999.
283000	034	173	-67.0	.3440-02	.5605-02	-9999.
284000	031	174	-68.3	.3290-02	.5359-02	-9999.
285000	027	176	-69.6	.3146-02	.5125-02	-9999.
286000	024	179	-70.8	.3008-02	.4901-02	-9999.
287000	020	182	-72.1	.2877-02	.4686-02	-9999.
288000	017	187	-73.4	.2751-02	.4481-02	-9999.
289000	014	194	-74.7	.2630-02	.4285-02	-9999.
290000	011	204	-76.0	.2515-02	.4098-02	-9999.
291000	009	220	-77.2	.2405-02	.3918-02	-9999.
292000	008	242	-78.5	.2300-02	.3747-02	-9999.
295000	018	246	-79.1	.1970-02	.3746-02	-9999.
298000	028	249	-78.5	.1692-02	.3025-02	-9999.
301000	074	275	-77.4	.1447-02	.2566-02	-9999.
304000	117	272	-76.2	.1238-02	.2177-02	-9999.
307000	150	271	-75.0	.1059-02	.1847-02	-9999.
310000	164	270	-73.8	.9052-03	.1567-02	-9999.
313000	160	269	-72.2	.7765-03	.1330-02	-9999.

TABLE 5. (Concluded)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
316000	158	269	-70.1	.6688-03	.1130-02	-9999.
319000	152	269	-68.0	.5760-03	.9603-03	-9999.
322000	138	269	-65.9	.4960-03	.8159-03	-9999.
325000	114	269	-63.8	.4271-03	.6931-03	-9999.
328000	077	268	-61.7	.3677-03	.5889-03	-9999.
331000	071	269	-58.3	.3178-03	.4999-03	-9999.
334000	062	268	-55.0	.2747-03	.4244-03	-9999.
337000	047	266	-51.7	.2374-03	.3602-03	-9999.
340000	025	262	-48.3	.2051-03	.3058-03	-9999.
343000	007	130	-45.0	.1771-03	.2596-03	-9999.
346000	027	097	-40.6	.1542-03	.2211-03	-9999.
349000	030	099	-35.2	.1351-03	.1890-03	-9999.
352000	033	101	-29.8	.1184-03	.1615-03	-9999.
355000	036	103	-24.4	.1037-03	.1380-03	-9999.
358000	040	106	-19.0	.9076-04	.1180-03	-9999.
361000	043	099	-13.5	.7948-04	.1009-03	-9999.
364000	045	102	-5.3	.7146-04	.8771-04	-9999.
367000	048	105	2.8	.6418-04	.7625-04	-9999.
370000	050	109	10.9	.5760-04	.6629-04	-9999.
373000	052	114	19.1	.5165-04	.5763-04	-9999.
376000	054	120	27.2	.4628-04	.5010-04	-9999.
379000	048	109	36.4	.4188-04	.4389-04	-9999.
382000	096	112	46.6	.3832-04	.3877-04	-9999.
385000	046	115	57.1	.3517-04	.3436-04	-9999.
388000	045	118	68.0	.3237-04	.3054-04	-9999.
391000	045	121	79.2	.2989-04	.2724-04	-9999.
394000	044	125	90.6	.2768-04	.2437-04	-9999.
397000	044	129	102.2	.2570-04	.2187-04	-9999.
400000	045	132	114.0	.2392-04	.1969-04	-9999.

TABLE 6. STS-5 SRB DESCENT-IMPACT SURFACE SHIP OBSERVATIONS

Site: USN Ship, Gen. H. S. Vandenberg

Location: 29°N Latitude
78°W Longitude

Date: November 11, 1982

Time: 1226 UT

Surface Observation:

Air Temp. °F	Wet-Bulb °F	Dew Point °F	Pressure (MSL) mb	Wind Direction	Wind Speed Kt.
75.0	68.0	65	1022.6 (60' station press = 1020.8 mb)	020°	22

Sky Observation:

Clouds	Total Sky Cover	Total Opaque Sky	Visibility (miles)
5/10 Cumulus at 1,800 ft	5/10	5/10	7

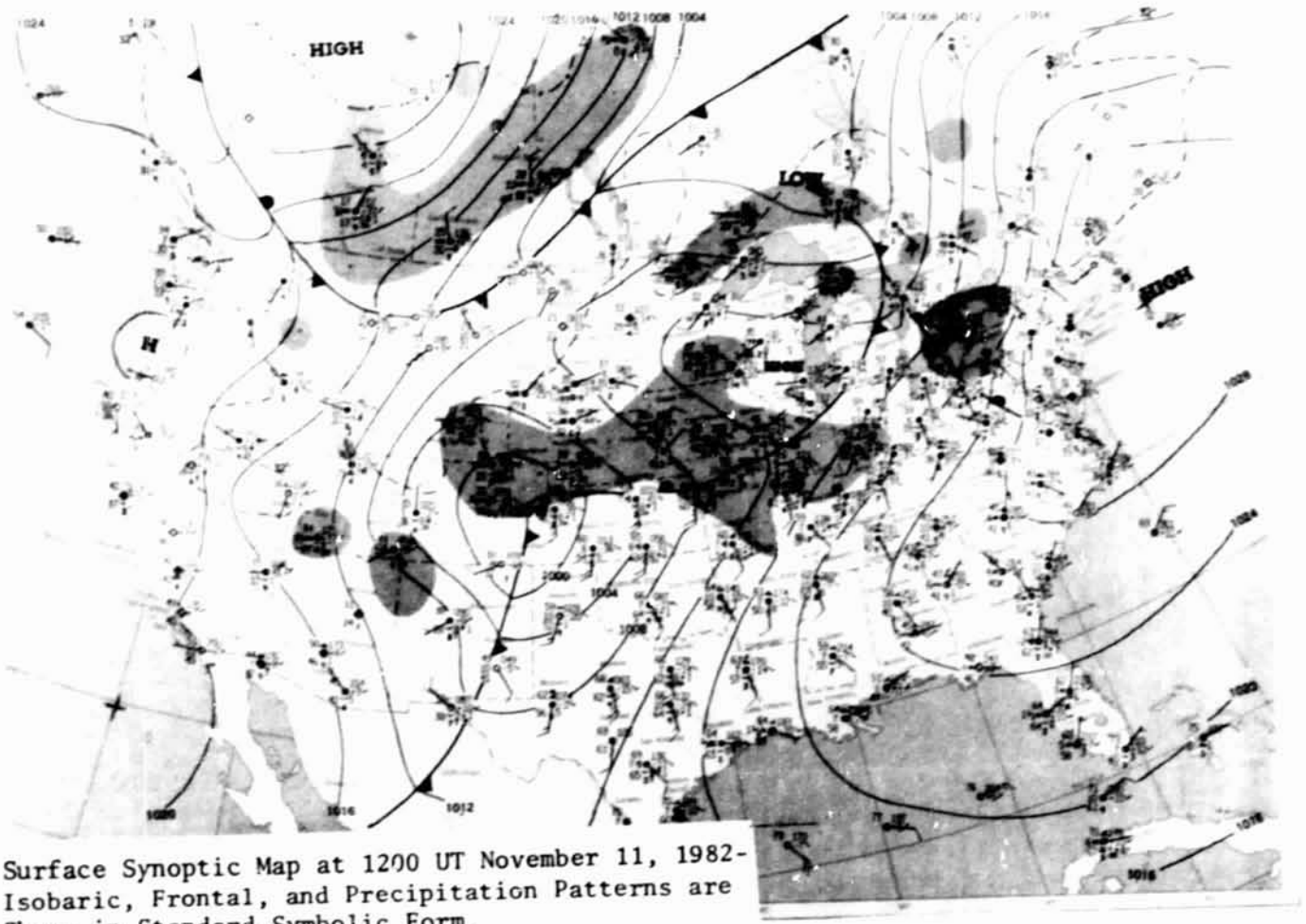
Sea Observation:

Sea Condition	Wind Waves		Swell Conditions		
	Freq. Sec.	Ht. m.	Dir. from which Swell is coming	Freq. Sec.	Ht. m.
Sea Moderate – Code 4 4/10 Breaking Waves 2/10 Foam Surface Sea Water Temp. = 24.0°C (75.2°F)	7	1	060°	7	2½

TABLE 7. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHT TESTS OF THE SPACE SHUTTLE VEHICLES

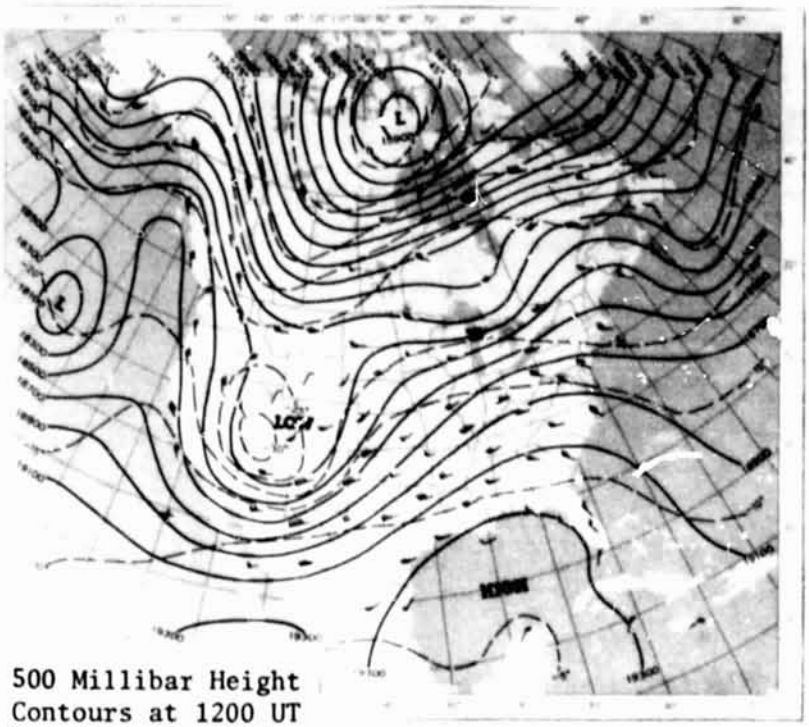
Vehicle Data					Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
					Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time[c] (EST) Nearest Minute	Launch Pad	Press[d] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/sec)	Dir. (deg)	Alt. (ft)	Speed (ft/sec)	Dir. (deg)	
1	STS-1	4/12/81	0700	39A	10.234[e]	21	82	11.8 15.2	125 120	44,300	98	250	
2	STS-2	11/12/81	1010	39A	10.166	23	61	27.0 27.0	345 355	36,300	158	286	
3	STS-3	3/22/82	1100	39A	10.160	24	71	7.0[f] 8.0[f]	50[f] 145[f]	45,000	119	250	Wind directional change observed at Pad just prior to L+0.[g]
4	STS-4	6/27/82	1100[h]	39A	10.200	29	70	5.8[i] 4.9[i]	133[i] 141i	47,900	37	329	
5	STS-5	11/11/82	0719	39A	10.227	22	68	22.0 35.0	90 90	40,600	146	336	

a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.
b. 1 min average prior to L+0 of 60 ft PLP (listed first) and 275 ft FSS winds measured above natural grade.
c. Eastern Standard Time unless otherwise noted.
d. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.
e. Pressure measurement applicable to 14 ft above MSL.
f. 10 sec average prior to L+0.
g. Due to onset of sea breeze.
h. Eastern Daylight Time.
i. 30 sec average prior to L+0.



Surface Synoptic Map at 1200 UT November 11, 1982- Isobaric, Frontal, and Precipitation Patterns are Shown in Standard Symbolic Form.

Figure 1. Surface synoptic chart 19 min prior to launch of STS-5.



500 Millibar Height
Contours at 1200 UT
November 11, 1982.
Continuous Lines Indicate Height Contours In
Feet Above Sea Level. Dashed Lines are Isotherms
In Degrees Centigrade. Arrows Show Wind Direction
and Speed at the 500 MB Level.

Figure 2. 500 mb map 19 min prior to launch of STS-5.

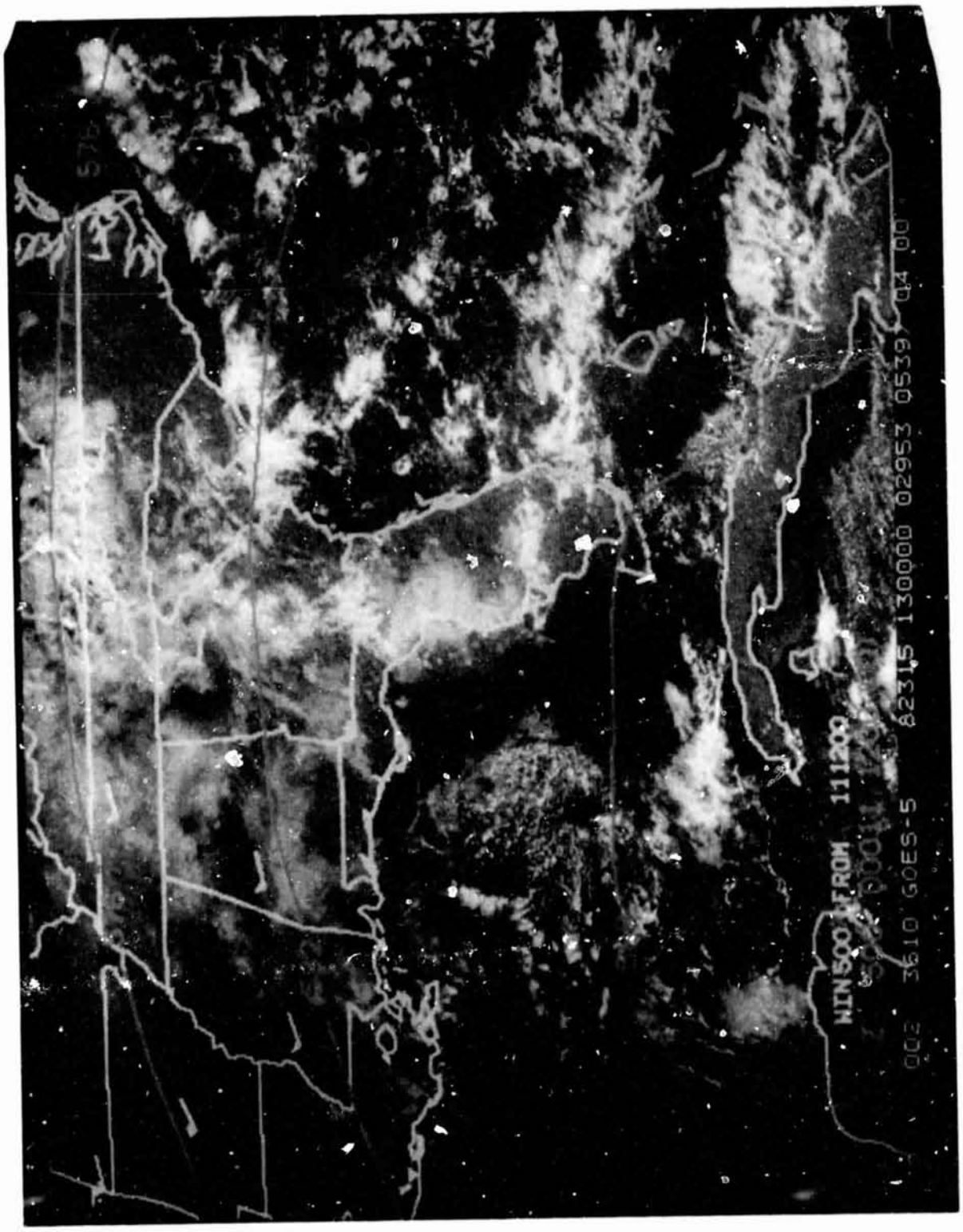


Figure 3. Goes-5 visible imagery of cloud cover 41 min after launch of STS-5 (1300 UT, November 11, 1982). 500-mb contours and wind barbs are also included for 1200 UT.

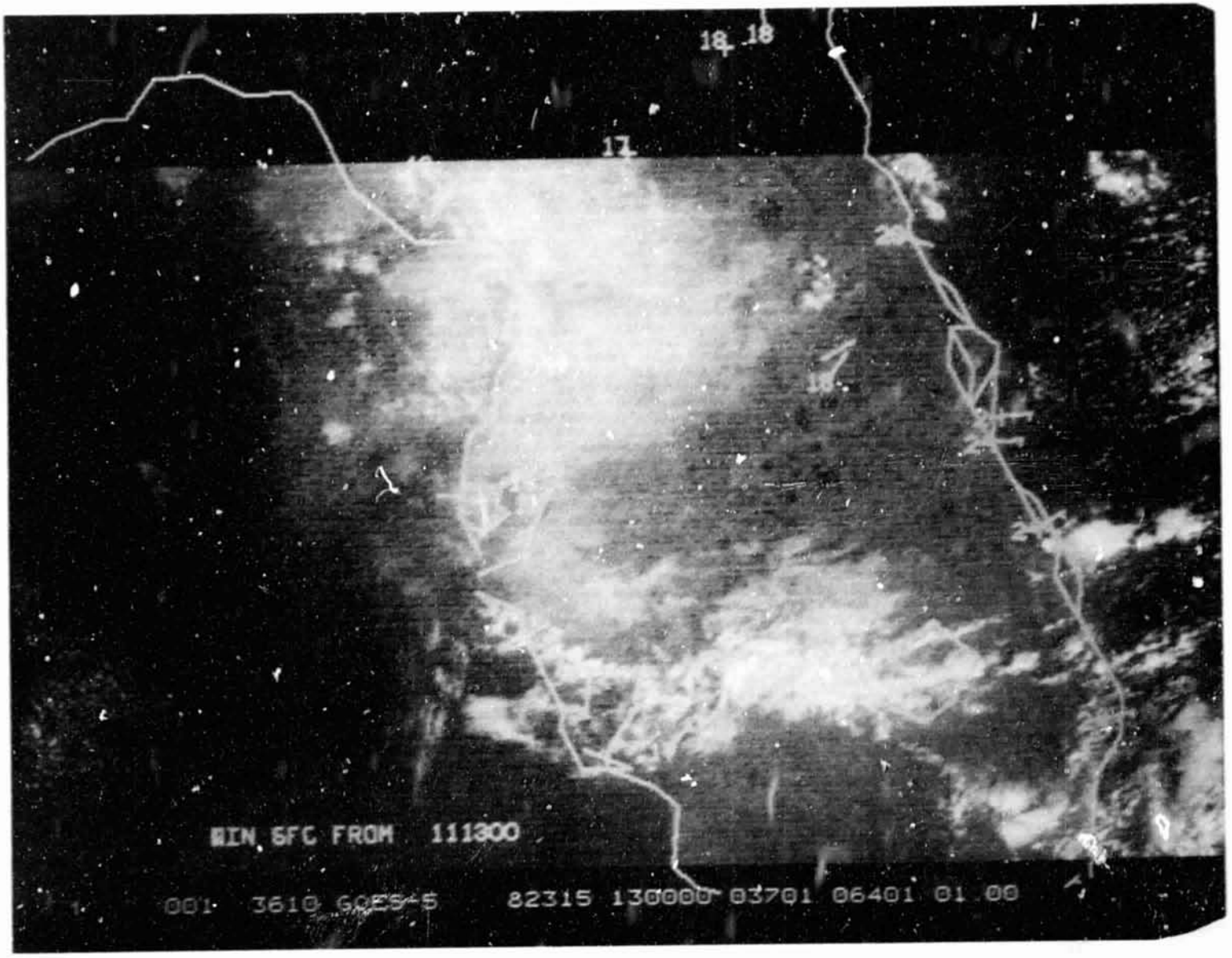


Figure 4. Enlarged view of GOES-5 visible imagery of cloud cover 41 min after launch of STS-5 (1300 UT, November 11, 1982). Surface temperatures and wind barbs for 1300 UT are also included.

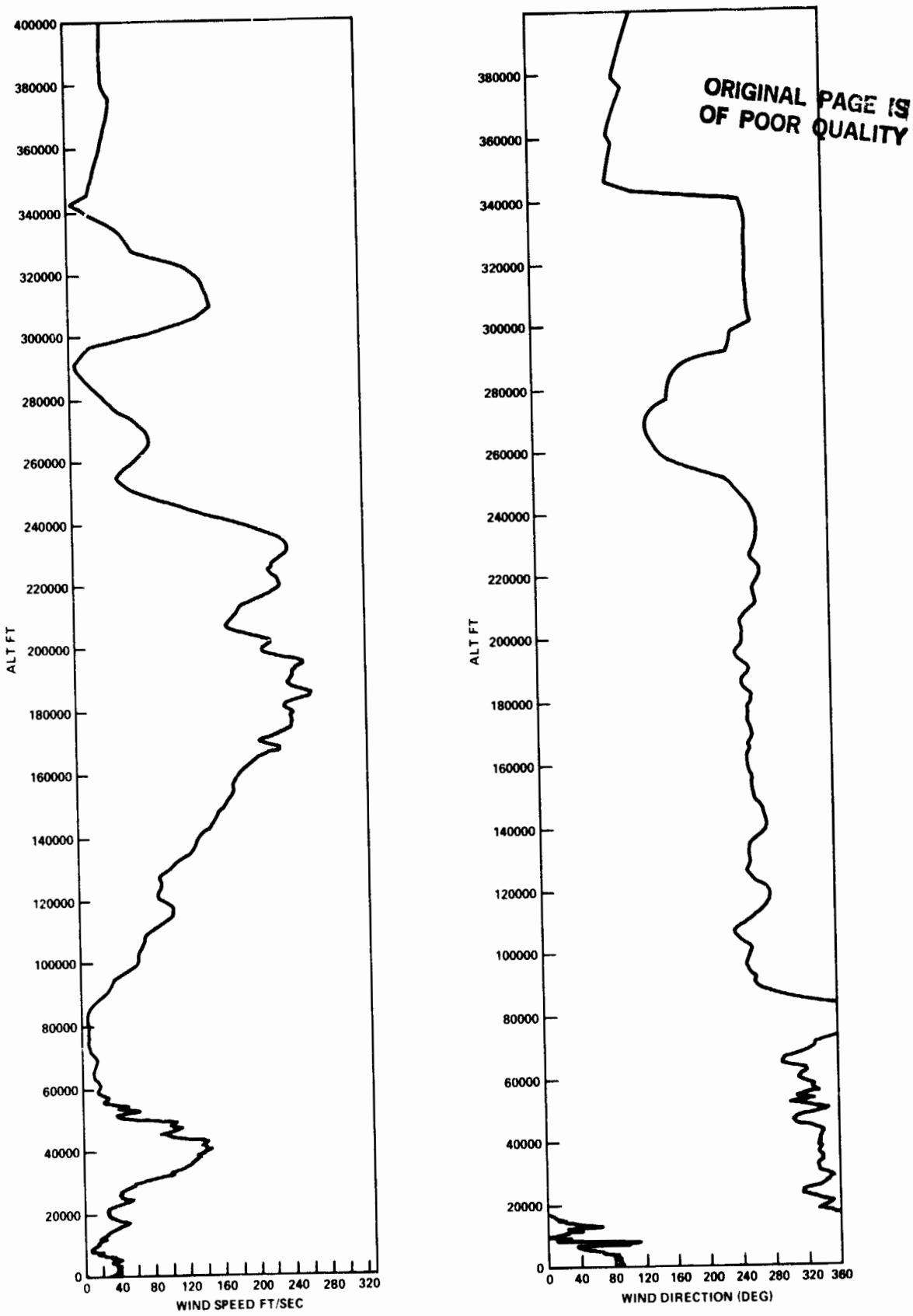


Figure 5. Scalar wind speed and direction at launch time of STS-5.

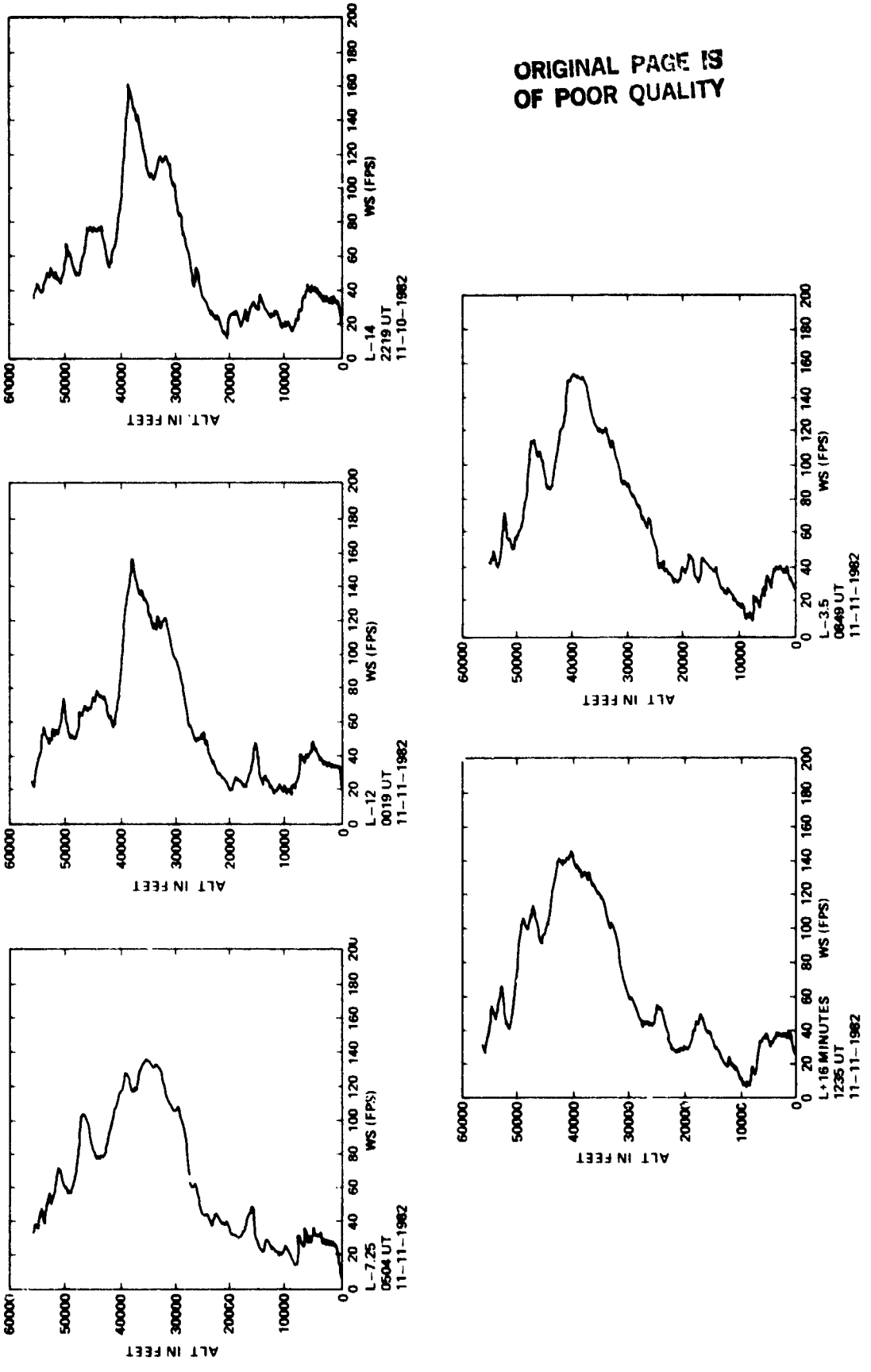


Figure 6. STS-5 prelaunch/launch Jimsphere-measured wind speeds (FPS).

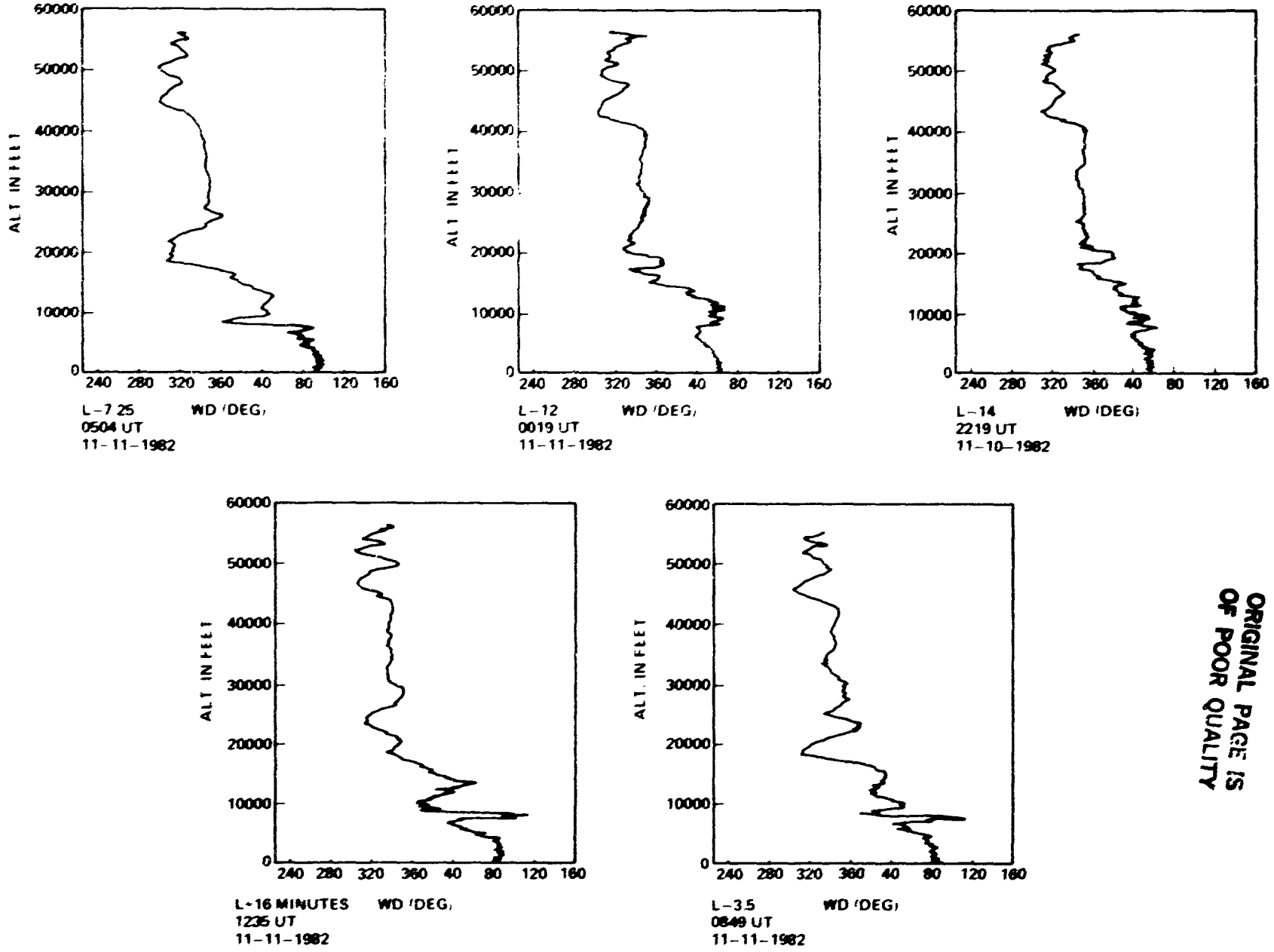


Figure 7. STS-5 prelaunch launch Jimsphere-measured wind directions (degrees).

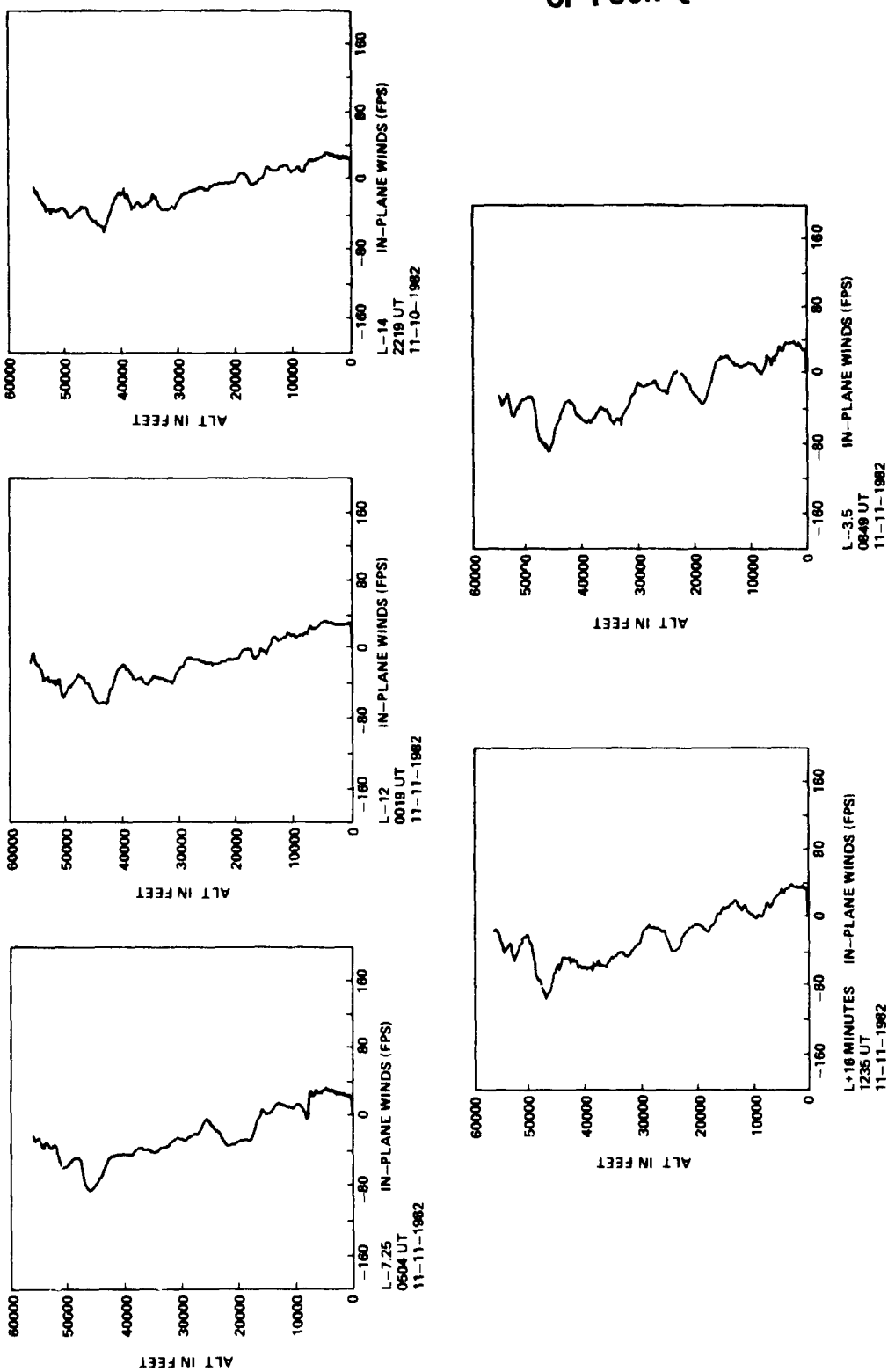


Figure 8. STS-5 prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Flight azimuth = 90 degrees.

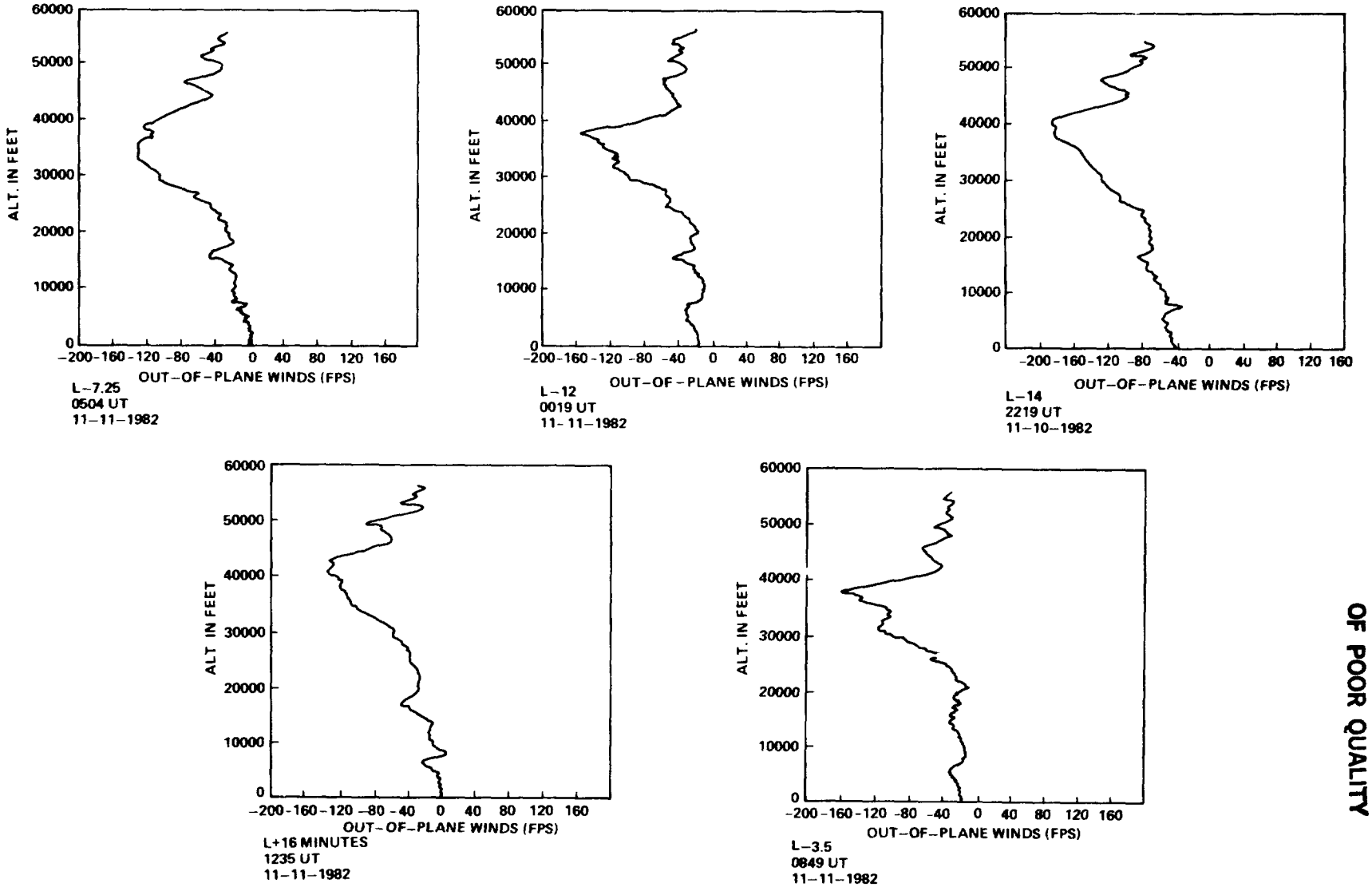
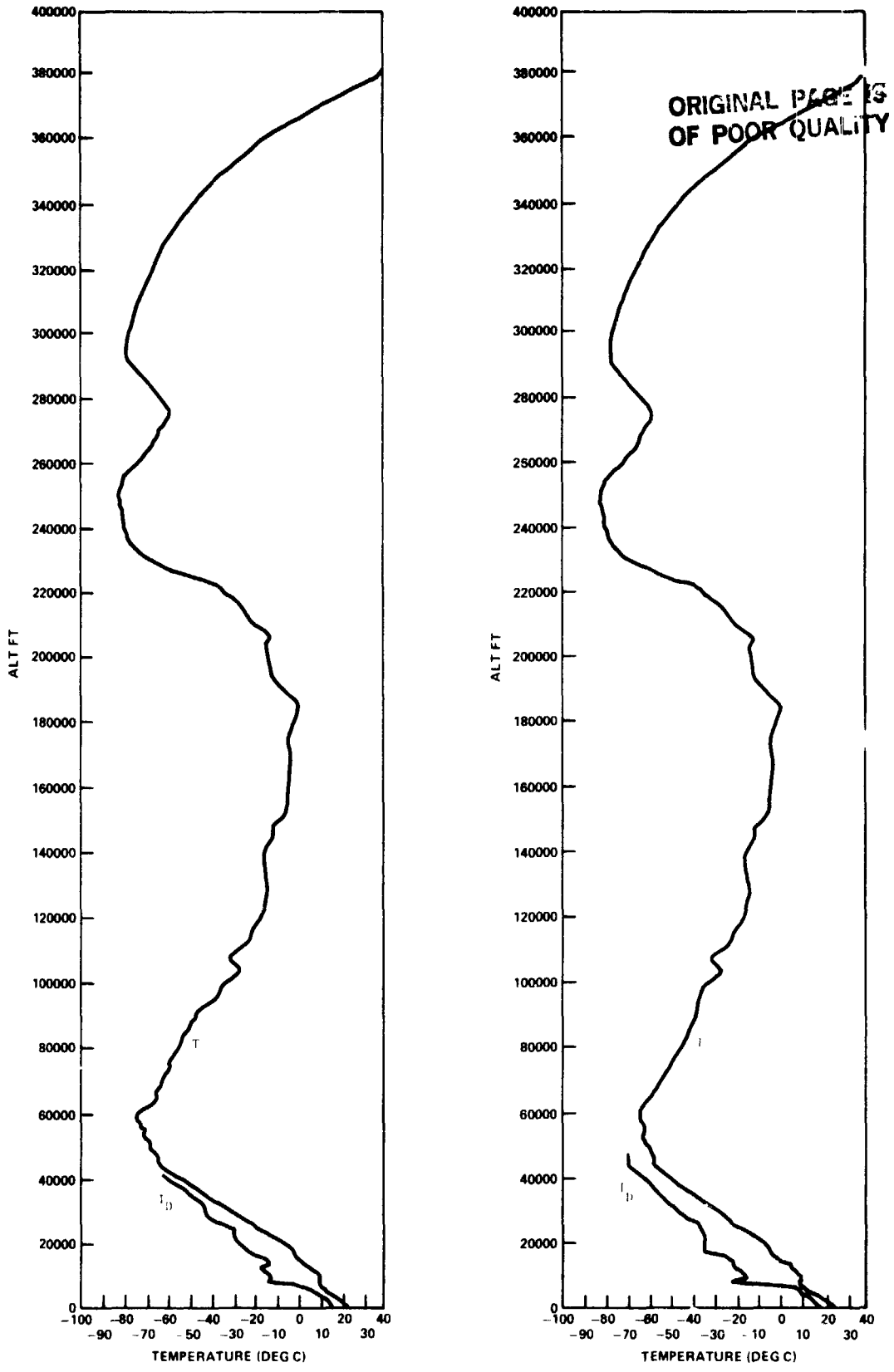


Figure 9. STS-5 prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS). Flight azimuth = 90 degrees.



T - Temperature

T_D - Dew point temperature

Figure 10. STS-5 temperature profiles versus altitude for launch (left) and SRB descent (right).

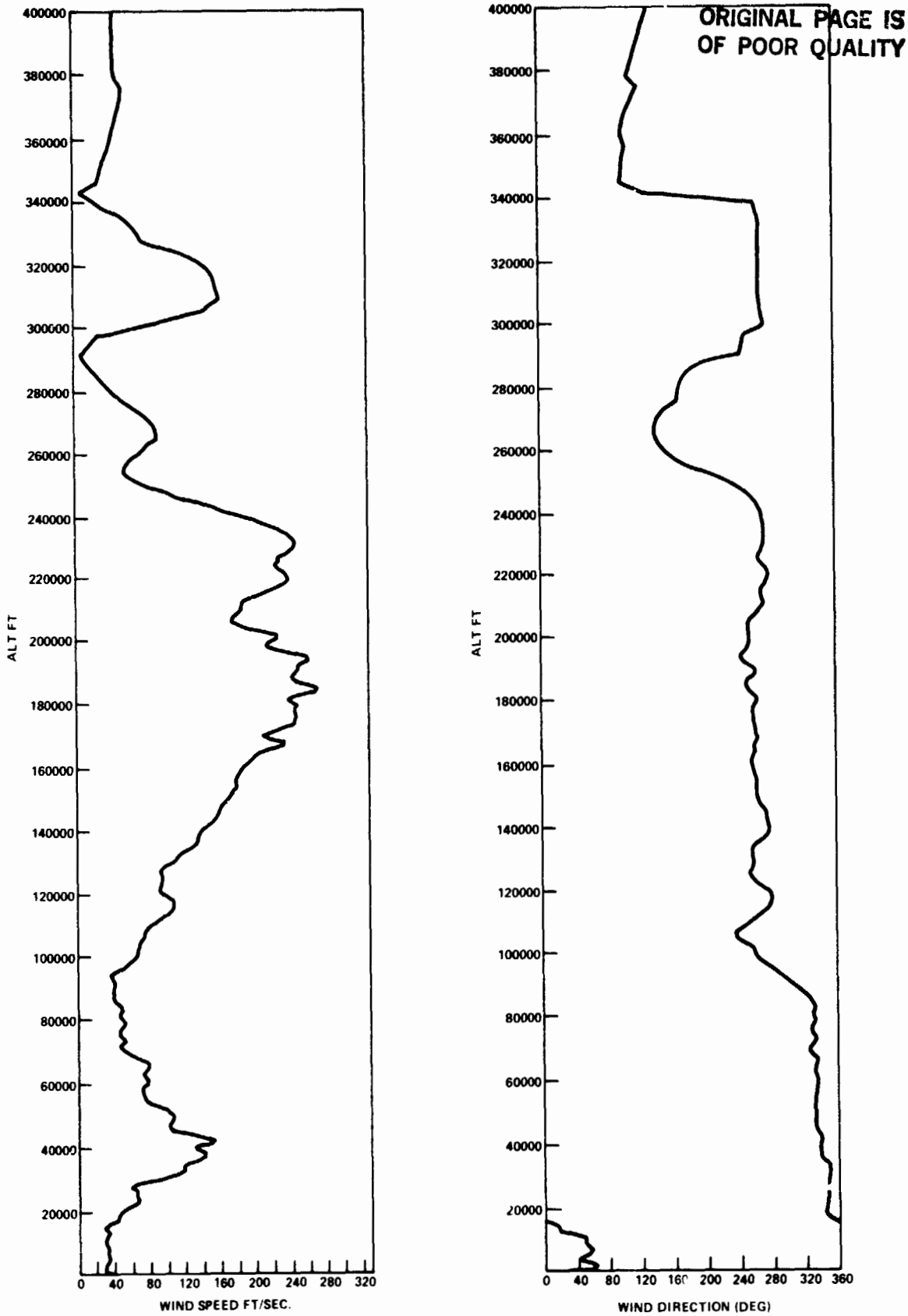


Figure 11. STS-5 scalar wind speed and direction for SRB descent.

APPENDIX A

UPPER ATMOSPHERIC CHANGES INFLUENCING STS-5

SUMMARY

Relatively strong wind profiles were observed in the 20,000 to 40,000 ft altitude STS-5 high dynamic pressure layer above KSC from L-14 through L+0 hr. As an illustration at L-14 hr a maximum windspeed profile value of 160 ft/sec associated with a direction of approximately 350 deg produced left crosswind values of approximately 160 ft/sec at approximately 39,000 ft altitude. This translates into a probability of less than 1 percent that this crosswind speed would occur based on historical data records. Some vehicle load indicators indicated values exceeding the earlier designated 100 percent capability as a result of this wind. The large increase in crosswind component between the L-26 and L-14 hr Jimsphere as shown in Figure A-1 was not anticipated from information available at the time of the L-24 hr LSEAT [(Shuttle) Launch Systems Evaluation Advisory Team] meeting. However, from examining the routine 1200 UT (6 a.m. CST) 10 November upper atmosphere analyses by NOAA, it is apparent that stronger NNW winds were likely over Central Florida at launch time than was evident from information available at the L-24 hr LSEAT meeting. When these analyses became available, 11 a.m. CST (L-19 hr), and if a procedure had been established, an updated advisory of the anticipated wind speed change could have been made to the LSEAT. In the future, if desired, it may be possible to reduce such surprises to the LSEAT in the period prior to L-14 hr if routine meteorological analyses are made available in a more timely manner using one of the interactive display systems such as McIDAS. This concern diminishes in importance beginning about L-14 hr because it is then that Jimsphere measurements become more frequent and the statistical risk for changes in the inflight winds for L+0 are incorporated as an allowance in the knockdown load dispersion calculations.

KSC AREA ATMOSPHERIC PATTERNS INFLUENCING STS-5 ACTIVITIES

The following is a synopsis of the atmospheric conditions which existed during the STS-5 countdown, some comments relative to the Prelaunch Wind Loads Monitoring Team's advisory role on expected inflight wind changes, and recommendations to improve inputs for LSEAT decisions.

The synoptic or large scale upper-atmosphere atmospheric pattern affecting the U.S. during STS-5 countdown (L-50 to L+0 hr) was dominated by an intense center of low pressure over California. A jet stream or band of strong winds (speeds approximately 185 ft/sec at 40,000 ft) associated with this system was oriented about this cyclonic center. This wide belt of high winds was indicated off the California coast arching southward and then eastward across the California Baja, then northeastward into New Mexico. Another upper atmosphere trough of low pressure was situated off the Atlantic coast of the U.S. east of the Florida peninsula. A ridge or area of higher pressure between these two cyclonic systems was present over Florida and surrounding region. The above-described synoptic pattern can be seen on a series of 200 millibar constant pressure analyses (approximately 40,000 ft altitude) presented here for 1200 UT 9 November, 1200 UT 10 November, and 0000 and 1200 UT 11 November 1982 (Figures A-2 through A-5).

THE INFLIGHT WIND SPEED CHANGE PREDICTION DILEMMA

It is characteristic of an atmospheric condition such as described above that, once established, a high degree of persistence may exist for several days. The wind direction during the STS-5 countdown sequences (L-50 to L+0) was, in fact, relatively persistent. However, significant wind speed increases, and especially left crosswinds, were measured by Jimsphere and rawinsonde balloon systems between L-26 and L-14 hr. The wind speeds associated with the deep layer of northerly wind directions produced large crosswind components above KSC and load exceedences in excess of the earlier designated 100 percent capability on some indicators. To anticipate this particular change in the atmospheric condition successfully for periods of 24 to 48 hr, the energetics of the large-scale, complex, low pressure system located near the California coast must be correctly assessed.

The wind speeds produced at 40,000 ft and other altitudes by this pressure system were directly related to a complex thermodynamic pattern existing within this large system. Perturbations of wind, temperature, humidity, and density propagated downwind (eastward, in this case) affected conditions at considerable distances from the cyclonic center. The development and timing of events on a meso-synoptic scale are difficult to anticipate even with the large-core computers and sophisticated models used by NOAA. This particular problem was compounded due to changes in the thermodynamic and wind field structure over the eastern Pacific where quantitative data are extremely sparse. Seemingly minor perturbations emanating from the large-scale trough altered dramatically the wind speed profile characteristics over the U.S. including KSC.

A point to keep in mind is that the rawinsonde profile data on the synoptic scale are measured routinely by NOAA only at 0000 UT (6 p.m., CST) and 1200 UT (6 a.m., CST). In addition, the 1200 UT data analyses, for example, do not become available through normal NOAA transmission channels for use until about 1700 UT (11 a.m., CST) or a lag of 5 hr. A post-flight analysis of the 1200 UT data (L-24 hr) for 10 November indicated that increased crosswind speeds could have been anticipated and the information provided to the LSHAT by L-19 hr if the most current analyses had been available earlier.

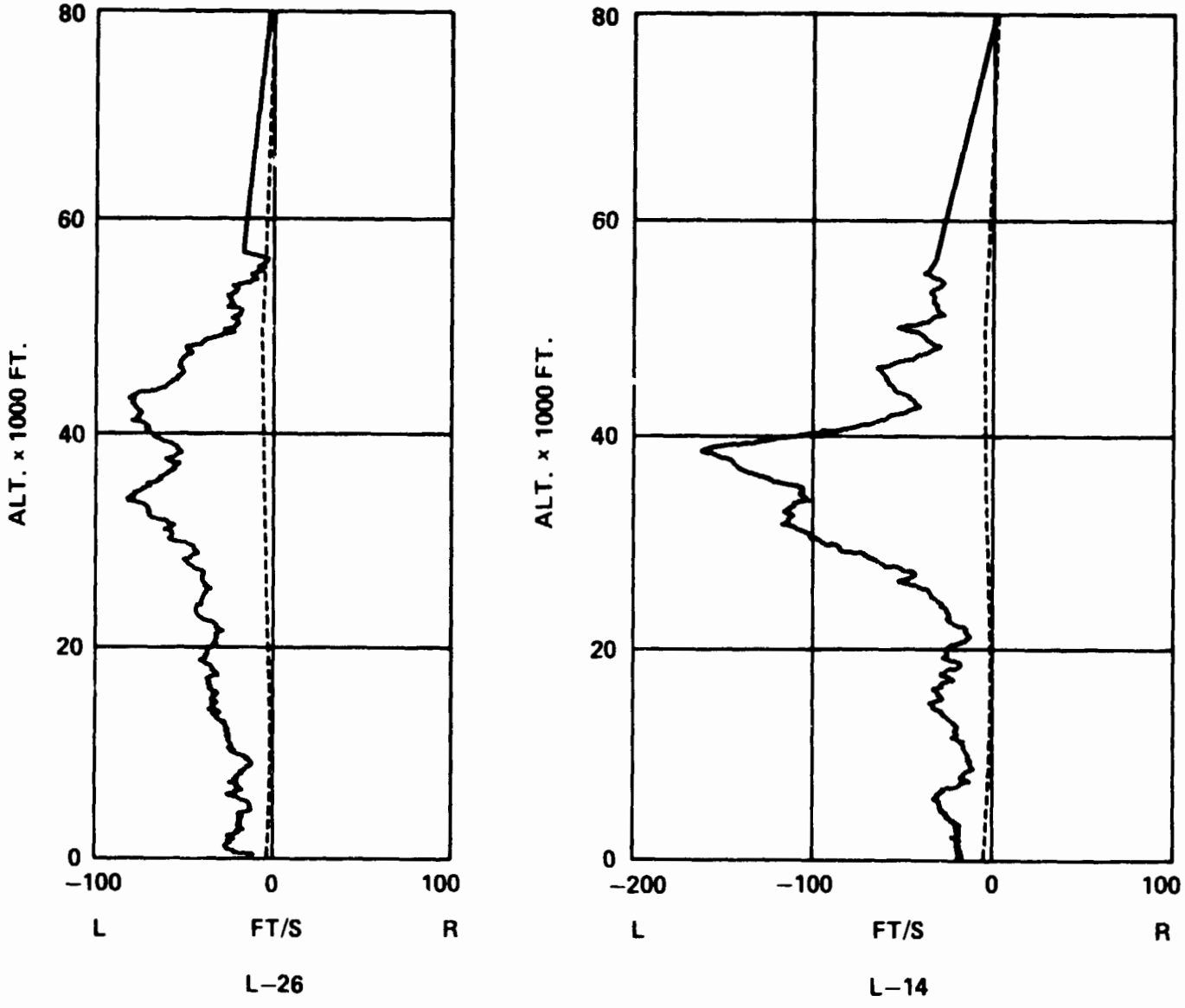


Figure A-1. STS-5 out-of-plane wind component time history.

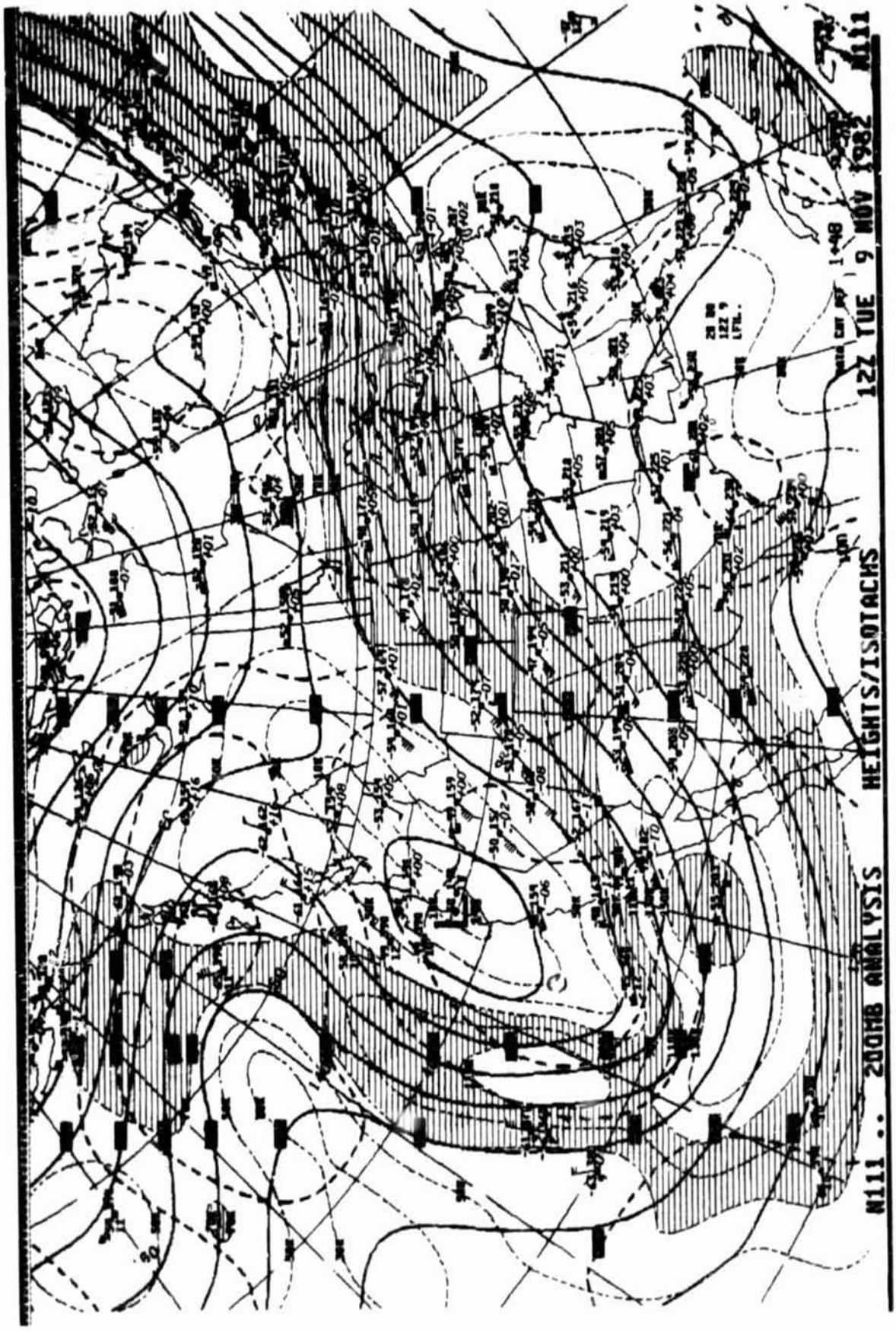


Figure A-2. 200 mb upper-air analysis for 1200 UT, 9 November 1982.

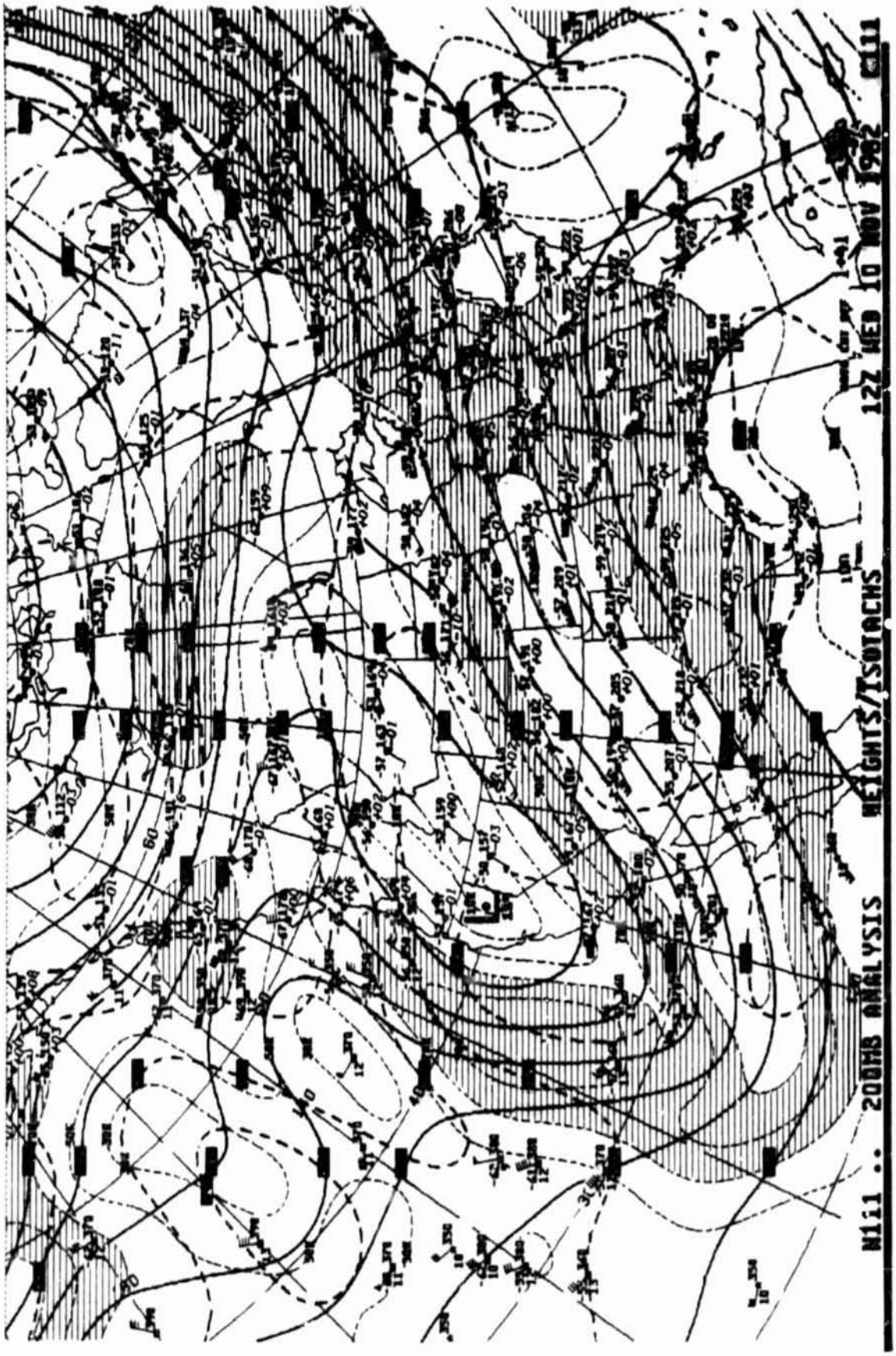


Figure A-3. 200 mb upper-air analysis for 1200 UT, 10 November 1982.

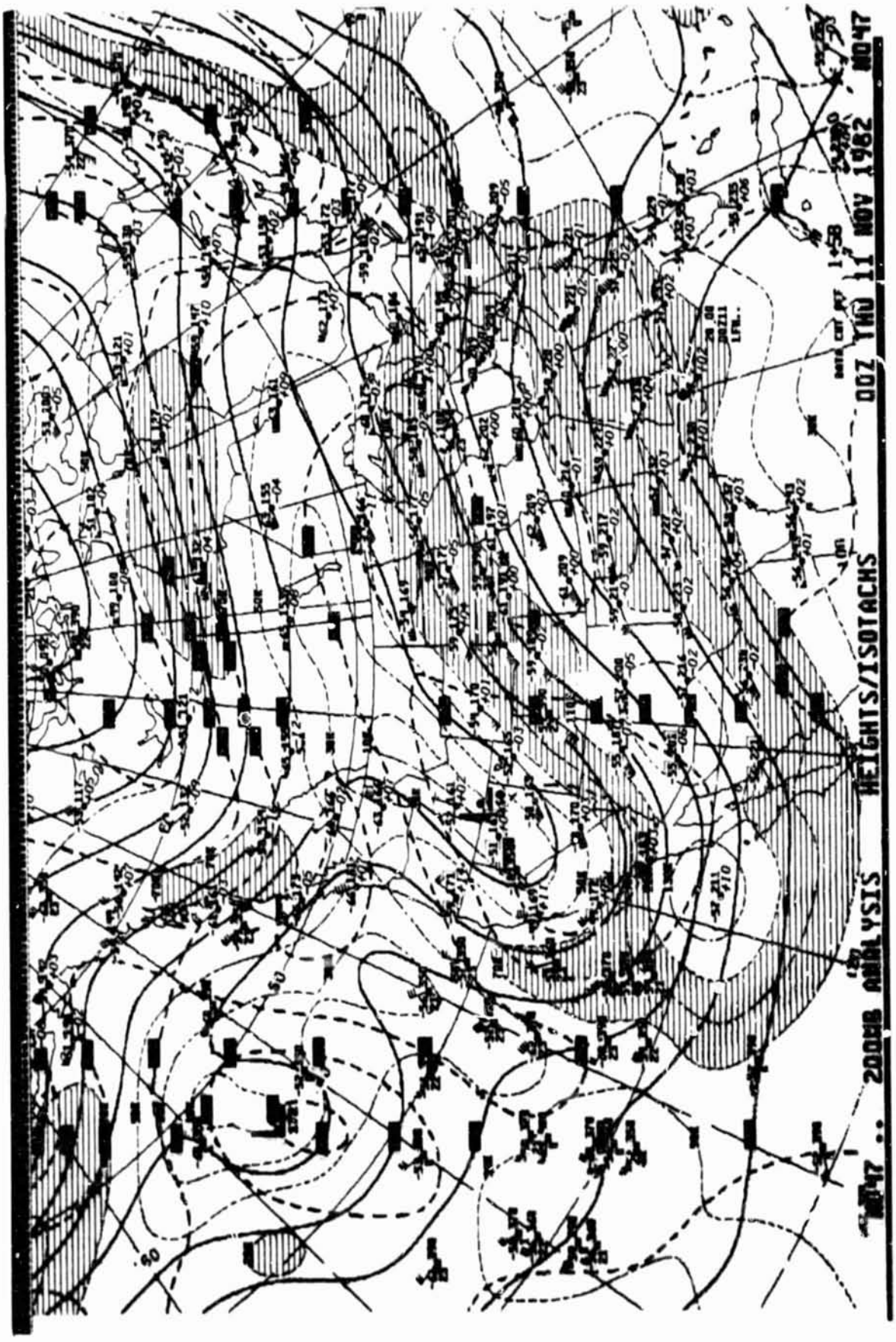


Figure A-4. 200 mb upper-air analysis for 0000 UT, 11 November 1982.

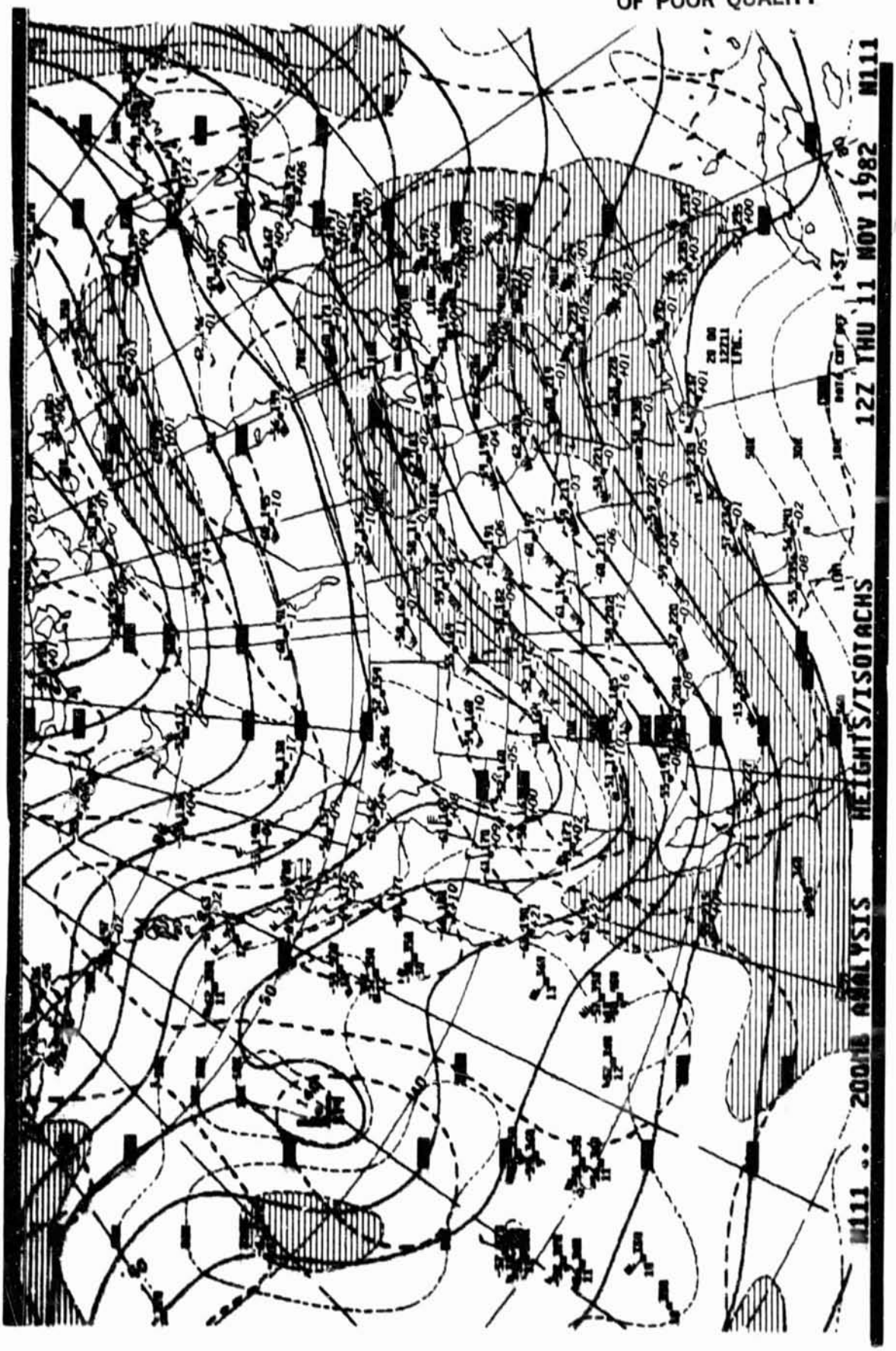


Figure A-5. 200 mb upper-air analysis for 1200 UT, 11 November 1982.

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